Recent fertility trends in the Pacific Islands

Michael J. Levin
and Robert D. Retherford

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ABSTRACT This paper reports on fertility estimates derived by applying the own-children method of fertility estimation to census data for seventeen island groups in the South Pacific region. Estimates were computed from three successive censuses for two island groups; two successive censuses for ten island groups; and one census for five island groups. Since each application of the own-children method provided fertility estimates for a ten- to fifteen-year period previous to the census, overlapping trend estimates were obtained for the twelve island groups for which at least two successive censuses were analyzed. This overlap provided a basis for checking the consistency of the fertility estimates. Trend estimates were also calculated for marital fertility and the Coale-Trussel *m* index of marital fertility control. Marital fertility estimates were computed by dividing the own-children estimates of age-specific birth rates by corresponding age-specific proportions currently married (also census-derived), and the *m* index of marital fertility control was calculated from the derived age pattern of marital fertility. The own-children fertility estimates are compared with estimates based on vital registration or other sources where available. Due to the unavailability of census tapes for some countries, not all island groups in the South Pacific are included in this analysis, but the coverage is complete enough to provide a broad picture of fertility levels and trends in the region over the past two decades.

Evidence on recent fertility trends in Pacific Island nations is not abundant, and that which exists tends to be scattered in papers and reports that are sometimes difficult to obtain. Yet all of these countries take censuses on a regular basis, and a great deal of information about fertility can be extracted from them. A method for doing so that is especially useful when census tapes of individual household records are available is the own-children method of fertility estimation. This is the method we have used, complemented by other demographic estimation techniques where appropriate.

For the most part, the basic own-children fertility estimates presented here were generated in a series of fertility estimation workshops held at the East-West Center over a period of several years. The series was coordinated by Michael Levin and involved the active collaboration of many persons, mostly from the Pacific Islands themselves. As the workshops progressed, it became apparent that a large and useful body of fertility estimates was accumulating. In some cases, fertility estimates were being produced where none existed before. In others, the fertility estimates derived by the own-children method could be compared with fertility estimates derived from the vital registration system, thereby providing checks for consistency and accuracy.

We decided to gather the material into a paper that would present and compare recent fertility trends in the Pacific Island nations that had par-

ticipated in the workshops. These nations include most of the South Pacific region, the most notable exclusion being French Polynesia. We also decided to extend the original tabulations produced in the workshops by adding further tabulations of nuptiality indices and martial fertility, derived by straightforward extension of the own-children methodology as well as related demographic estimation techniques. In the end, we were able to produce estimates of trends in both overall fertility and marital fertility, as well as trends in a demographic index of marital fertility control.

This report emphasizes the estimates themselves, without much interpretation. So diversified are the socioeconomic and population policy contexts in the region that a comprehensive interpretation of the results would have been difficult and would have lengthened an already rather long report. It is hoped that the interesting and sometimes unexpected fertility patterns uncovered here will stimulate further, more interpretative studies.

METHODOLOGY AND DATA

The own-children method has been described in earlier publications and needs only to be recapitulated briefly here. (For more detailed accounts, see, for example, Cho 1973 and Retherford and Cho 1978; the current versions of the own-children computer programs use formulas given in the second of these two sources.) The method is a census- or survey-based reverse-survival technique for estimating age-specific birth rates for years previous to a census or household survey. In most applications, enumerated children are first matched to mothers within households on the basis of responses to questions on age, sex, marital status, relation to head of household (or householder), and number of children still living. (In this paper, however, matching was based in some cases on a special question on mother's line number or person number in the household schedule, if mother was present.) These matched (i.e., own) children, classified by child's age and mother's age, are reverse-survived to estimate numbers of births by age of mother in previous years. Reverse-survival is also used to estimate numbers of women in previous years. After adjustments are made for incorrect enumeration and unmatched (non-own) children, age-specific birth rates are calculated by dividing the number of births by the number of women. Estimates are computed for each previous year or group of years back to fifteen years before the census. Estimates are not computed further back than fifteen years because births must then be based on children at ages 15 or older at enumeration, a large proportion of whom do not reside in the same household as their mother and hence cannot be matched. All calculations are done initially by single years of age and time (years before the census). Estimates for groups of ages or groups of calendar years are

obtained by appropriately aggregating numerators and denominators of single-year rates and then dividing the aggregated numerator by the aggregated denominator. For reasons of economy, the method is usually applied to census samples rather than complete counts, but in this paper the applications are to complete counts since the populations are comparatively small.

Non-own (unmatched) children are allocated to mothers by multiplying each age-specific category of own (matched) children, specified by mother's age, by the corresponding age-specific ratio of all children to own children. Thus the number of own children at a given age is adjusted upward by the same factor regardless of mother's age, thereby introducing some error in the fertility estimates since the proportionate distribution of non-own children by age of mother generally differs somewhat from the proportionate distribution of own children by age of mother. It is, of course, impossible to specify non-own adjustment factors by mother's age, since the mother of an unmatched child is by definition not in the household. Since older women are usually in more stable household situations than younger women, the nature of the error from not specifying non-own adjustment factors by mother's age is usually to reallocate erroneously a certain proportion of non-own children of a given age from younger mothers to older mothers. This error, if present, usually has little effect on the total fertility rate, but it produces an age pattern of fertility that is too low at the younger ages and too high at the older ages. The error is minor if the adjustment factors for non-own children are low, but sometimes these factors can be quite high.

Figure 1 shows the seventeen island groups included in this study. Table 1 shows the date of each census to which the own-children method was applied, as well as background information on population size, average annual population growth rate (computed from population totals from the most recent census included in our analysis and the preceding census), sex ratio, Myers's index of digit preference (a measure of the quality of age reporting, described in Shryock and Siegel 1973: vol. 1, pp. 206–8), area, and population density at the time of the census. Population sizes range from just under 4,000 for Niue in 1976 to almost 600,000 for Fiji in 1976. Population densities are highly variable in the region, ranging from seven persons per square kilometer in Solomon Islands in 1976 to 317 in Truk in 1980. Male/female sex ratios of population range from 0.87 in Tuvalu in 1979 to 1.11 in the Northern Mariana Islands in 1980. Such extreme sex ratios may be due to sex-selective undercounts or sex-selective migration, the latter being more likely. Mainly because of variations in fertility and migration patterns, annual population growth rates range from –5.2 percent in Niue to 4.1 percent in Tuvalu. The quality of age reporting, as indi-

Table 1. Selected demographic indicators

Island group	Census date	Population	Intercensal growth rate	Sex ratio (M/F)	Myers's Index	Area (km²)	Population density (/km²)
Melanesia							
Fiji	13/9/1976	588,068	2.1	1.02	2.1	18,272	32
Solomon Islands	8/2/1976	196,823	3.3	1.09	3.2	28,530	7
Micronesia							
Guam	1/4/1980	105,979	2.2	1.09	2.1	541	196
Kiribati	13/12/1978	56,452	1.7	0.97	4.6	690	82
TTPI	26/3/1967	91,448		1.05	NA	1,832	50
	18/9/1973	115,251		1.07	1.0	1,832	63
	1/4 & 15/9/1980	132,929	2.0	1.06	3.0	1,832	73
NMI	18/9/1973	14,333		1.09	1.9	471	30
	1/4/1980	16,780	2.4	1.11	1.6	471	36
Marshalls	18/9/1973	25,045		1.07	2.1	179	140
	15/9/1980	30,873	3.0	1.06	3.9	179	172
Palau	18/9/1973	12,673		1.09	2.0	460	28
	15/9/1980	12,116	-0.6	1.08	3.2	460	26
FSM	18/9/1973	62,831		1.05	1.0	722	87
	15/9/1980	73,160	2.2	1.05	2.9	722	101
Ponape & Kosrae	18/9/1973	23,252		1.05	1.5	483	48
	15/9/1980	27,572	2.4	1.03	2.4	483	57
Truk	8/9/1973	31,609		1.05	1.5	118	268
	15/9/1980	37,488	2.4	1.05	3.6	118	318

Yap	18/9/1973	7,870		1.06	1.7	121	65
	15/9/1980	8,100	0.4	1.04	4.5	121	67
Polynesia							
Niue	29/9/1976	3,843	-5.2	1.01	3.7	259	15
American Samoa	25/9/1974	29,190		1.02	6.9	197	148
	1/4/1980	32,297	1.8	1.03	2.6	197	164
Western Samoa	25/9/1961	114,427		1.06	3.1	2,935	39
	21/9/1966	131,377		1.07	7.0	2,935	45
	3/11/1971	146,626	2.2	1.07	1.1	2,935	50
Tonga	30/11/1966	77,429		1.06	4.4	699	111
	30/11/1976	90,085	1.5	1.05	3.7	699	129
Tuvalu	27/5/1979	7,357	4.1	0.87	4.0	26	283

Sources: **Fiji**: Zwart (1968); Fiji, Parliament of Fiji (1976: vol. 1, table 6).
Solomon Islands: Groenewegen (1970).
Guam: U.S. Department of Commerce (1973a; 1980).
Kiribati: Groenewegen and Bailey (1975); Kiribati, Ministry of Home Affairs (1980: table 5).
Trust Territory of the Pacific Islands: University of Hawaii (n.d.); U.S. Department of Commerce (1973b: table 3; 1983b: table 16).
Niue: Niue, Department of Justice (1974; 1978).
American Samoa: Government of American Samoa (n.d.); U.S. Department of Commerce (1983b: table 16).
Western Samoa: Government of Western Samoa (1962; 1968; n.d.).
Tonga: Fiefia (1966: table 5); Kingdom of Tonga (1976: table 1).
Tuvalu: Groenewegen and Bailey (1975); Government of Tuvalu (1980).

Notes: TTPI denotes Trust Territory of the Pacific Islands. NMI denotes Northern Mariana Islands. FSM denotes Federated States of Micronesia. For TTPI in 1980, the Northern Marianas census was taken 1 April 1980, and the remainder of the TTPI was taken 15 September 1980.

Growth rates are average annual growth rates (in percentages) for the period between the most recent census and the immediately preceding census for each island group. For some of the island groups in the table, the date of the previous census is not indicated; the dates of the previous censuses are 1966 for Fiji, 1970 for Solomon Islands, 1973 for Kiribati, 1971 for Niue, and 1973 for Tuvalu. Ages used to calculate Myers's Index are 13 to 62, for both sexes combined. Sex ratios are based on the total population of all ages.

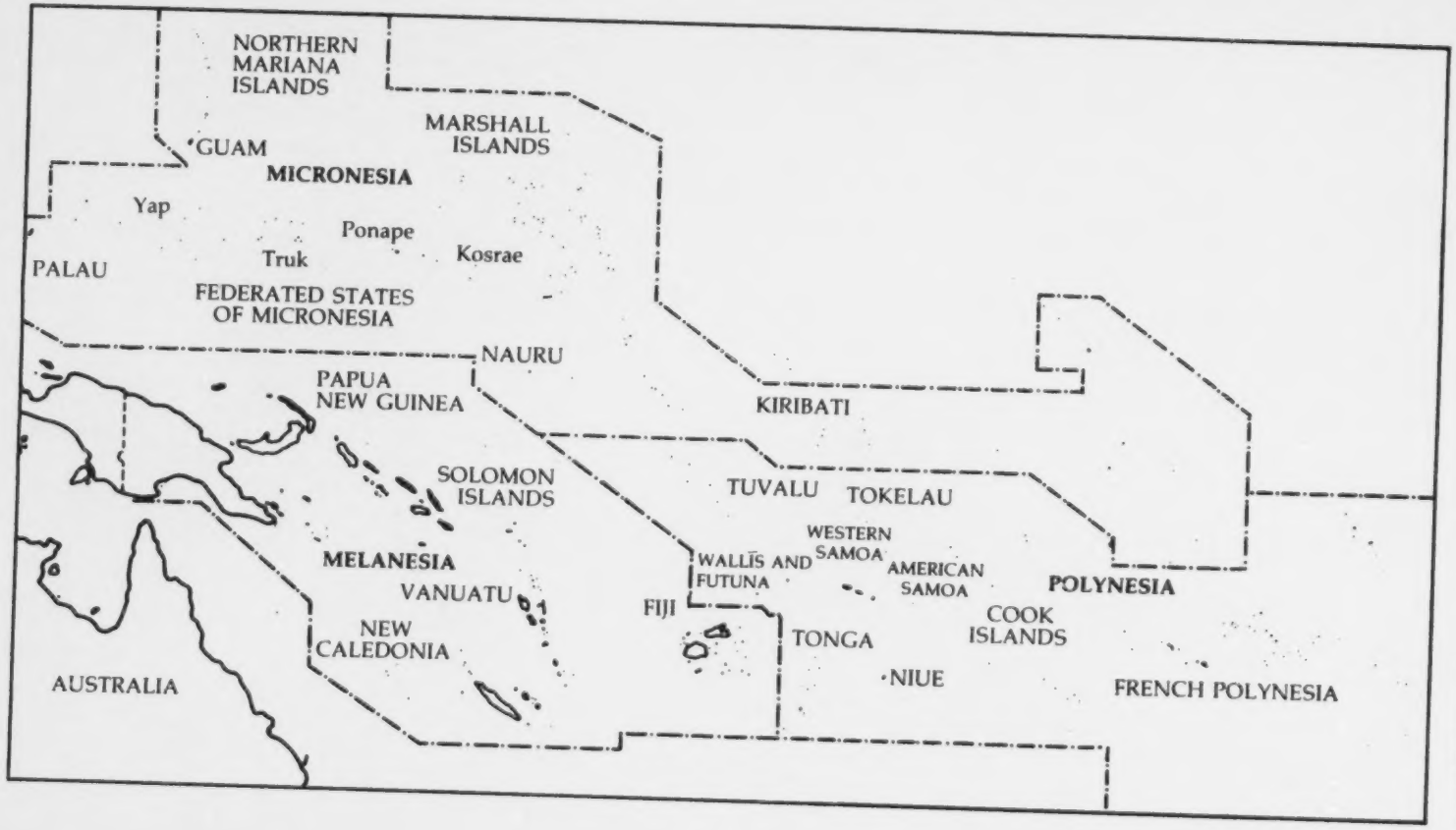


Figure 1. The South Pacific region

cated by Myers's index (based on ages 13–62), is rather good, ranging between index values of 1.0 and 7.0. We shall refer to these statistics again when interpreting fertility estimates presented later in the paper.

Proportions of non-own children to all children by age of child, shown in Table 2, are not the same as the non-own adjustment factors themselves. If the proportions in Table 2 are denoted by R_i, where i denotes age of child, then the multiplicative non-own adjustment factors described in the previous paragraph are calculated as $1/(1-R_i)$. The table shows that non-own factors tend to increase fairly smoothly with age of child, which is expected since an older child is usually more likely than a younger child to be living in another household or to have a deceased mother. The table shows also that the magnitude of the non-own proportions differs widely from one island group to another. For example, in Guam the proportions never exceed 8 percent, while in Yap and Western Samoa they sometimes exceed 45 percent.

Guam differs significantly from the other island groups because of the presence of the U.S. military and a generally Western economy and social organization. The other island groups share common cultural features such as migration to urban areas for work or schooling, movement among islands to visit relatives or friends, migration to other countries (mainly the United States, New Zealand, and Australia), and a fair amount of adoption. Unlike Western-style adoption, adoption in the Pacific is usually between relatives and serves to solidify social and political ties (Carroll 1970). The effect of both back-and-forth migration (which is often temporary, with children left in the care of relatives) and adoption is to increase the proportion of non-own children.

In Table 2, the non-own proportions are labeled either RHH (match of children to mothers based on relation to head of household, or householder, and the other attributes mentioned earlier) or MPN (match based on mother's person number or line number in the household schedule). (For a description of the computer algorithm used in RHH matching, see Ho 1977.) MPN matching is useful in cases where households are large and complex and non-own proportions are large, and it usually results in a slight improvement in the accuracy of the fertility estimates (Levin and Retherford 1982).

Reverse-survival requires life tables, and the sources for these are shown in Table 3. In most cases, life tables were obtained through use of census questions on number of children ever born and number of children still living. By means of a method developed by Brass (1975), this child survivorship information was used to obtain estimates of child mortality that were in turn matched to the appropriate level of the Coale–Demeny Model West life table family (Coale and Demeny 1966). (The procedure for obtaining

Table 2. Percentage of all children who are non-own, by age of child

Island group	Census year	Type of match[a]	Age of child														
			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Melanesia																	
Fiji																	
Fijians	1976	MPN	8.7	13.9	16.0	18.2	19.8	20.5	21.6	22.2	22.3	23.0					
Indians	1976	MPN	6.4	7.1	6.9	7.8	7.7	8.4	9.31	10.2	10.9	11.4					
Solomon Islands	1976	RHH	2.6	4.2	6.2	7.7	8.0	9.1	10.5	11.9	13.0	14.9	15.0	18.9	20.3	22.3	
Micronesia																	
Guam	1980	MPN	2.7	3.9	3.6	3.7	4.2	5.1	4.7	5.9	5.2	5.3	5.9	7.1	7.4	7.9	7.9
Kiribati	1978	MPN	3.6	11.3	15.7	17.8	21.3	22.0	24.0	21.8	23.8	24.3	26.6	28.2	32.9	34.0	37.0
TTPI	1967	MPN	9.5	13.0	15.8	16.4	17.1	17.7	17.8	19.6	21.0	20.9	22.1	25.8	27.3	28.9	28.2
	1973	RHH	10.1	12.6	15.4	15.9	17.6	16.9	18.2	18.6	19.7	20.3	20.6	22.1	22.4	26.5	33.4
	1980	MPN	9.2	12.6	14.5	13.2	15.2	16.9	17.8	18.2	17.8	20.3	21.6	22.9	23.0	27.8	29.3
NMI	1973	RHH	8.2	8.1	10.9	11.7	13.9	12.7	13.2	12.1	10.7	12.7	12.5	13.5	14.0	17.0	20.1
	1980	MPN	5.6	9.3	7.3	5.4	10.3	9.1	11.1	12.5	13.1	13.3	14.5	15.4	13.1	17.3	15.5
Marshalls	1973	RHH	12.7	18.2	18.3	20.3	20.9	19.3	19.1	20.7	21.2	23.0	23.5	26.0	28.2	29.2	37.0
	1980	MPN	9.8	13.8	14.9	13.9	16.4	15.9	18.3	16.6	18.4	18.1	20.6	21.6	23.1	27.7	29.4
Palau	1973	RHH	17.3	21.4	26.5	25.3	27.6	29.2	27.1	27.8	29.6	20.9	27.9	25.5	26.1	30.7	41.9
	1980	MPN	15.0	23.9	25.4	22.6	24.0	28.9	24.3	25.9	21.9	26.8	30.4	27.4	27.5	27.3	27.0
Ponape & Kosrae	1973	RHH	7.4	10.3	13.2	13.4	14.0	13.1	14.6	15.9	17.0	17.1	18.0	18.1	16.8	22.8	28.3
	1980	MPN	5.8	9.7	10.6	8.7	8.7	11.3	11.2	12.4	10.5	14.4	13.2	13.2	14.3	12.8	16.1
Truk	1973	RHH	7.6	8.3	12.5	12.9	14.6	13.6	16.6	14.6	17.4	18.3	18.4	19.8	21.5	26.8	33.9
	1980	MPN	8.6	8.6	11.5	10.2	10.7	12.3	11.9	13.0	13.7	14.7	15.5	17.2	15.8	20.4	20.4

Yap	1973	RHH	13.4	13.1	18.5	16.1	22.8	23.3	27.1	30.8	30.2	31.3	30.8	31.0	34.5	38.5	46.7
	1980	MPN	9.4	12.6	12.6	18.4	19.2	18.9	23.9	22.9	18.4	25.0	22.9	26.8	26.5	35.2	38.8
Polynesia																	
Niue	1976	MPN	5.9	20.8	19.4	14.4	21.6	19.2	19.8	29.1	29.6	27.5					
American Samoa	1974	MPN	13.2	15.5	18.6	17.2	19.2	21.0	17.5	20.3	20.1	20.2	21.9	24.1	21.5	27.9	27.8
	1980	MPN	9.9	10.4	9.4	11.9	12.6	12.2	12.0	13.4	14.4	12.7	15.4	16.5	15.1	15.9	20.3
Western Samoa	1961	RHH	24.6	24.2	21.8	20.8	19.8	19.4	21.7	21.5	22.9	21.8	23.9	24.6	28.9	32.1	33.2
	1966	RHH	17.2	20.4	24.2	24.1	25.3	26.8	29.4	31.3	32.7	34.6	34.8	36.1	40.7	42.2	48.1
	1971	RHH	12.0	17.0	19.0	20.3	20.6	23.0	23.5	27.0	26.9	29.7	31.8	34.3	37.6	40.7	45.4
Tonga	1966	RHH	4.0	6.6	8.2	10.8	12.5	11.2	8.1	10.0	10.5	11.1	12.4	12.5	14.2	16.4	17.6
	1976	RHH	8.5	9.0	10.7	10.5	10.0	9.0	10.0	8.7	9.3	8.9	8.0	7.1	6.8	5.2	3.5
Tuvalu	1979	MPN	4.4	20.6	18.7	20.7	25.2	21.2	28.5	25.6	25.8	24.7	21.8	44.3	54.9	48.2	41.7

a. RHH indicates that matching of children to mothers was accomplished using information on relationship to head of household (along with age, sex, marital status, and number of living children). MPN indicates that matching was done on the basis of mother's person number in the household schedule, which was used in some of the censuses.

Table 3. Life tables used for generating own-children fertility estimates

Island group	Census year	Life tables[a] Source	e_0^f
Melanesia			
Fiji			
Fijians	1976	CD West 20.0	67.6
Indians	1976	CD West 20.0	67.6
Solomon Islands	1976	Brass	54.0
Micronesia			
Guam	1980	CD West 23.1	75.3
Kiribati	1978	Brass	53.7
TTPI	1967	CD West 19.0	65.1
	1973	CD West 18.0	62.6
	1980[b]	—	—
NMI	1973	CD West 19.8	67.1
	1980	CD West 20.4	68.6
Marshalls	1973	CD West 16.9	59.8
	1980	CD West 18.7	64.3
Palau	1973	CD West 19.5	66.3
	1980	CD West 21.1	70.3
FSM	1973[b]	—	—
	1980[b]	—	—
Ponape & Kosrae	1973	CD West 18.7	64.3
Ponape	1980	CD West 20.3	68.3
Kosrae	1980	CD West 19.8	67.1
Truk	1973	CD West 17.5	61.3
	1980	CD West 19.2	65.6
Yap	1973	CD West 18.7	64.3
	1980	CD West 19.8	67.1
Polynesia			
Niue[c]	1976	CD West 20.5	68.8
American Samoa	1974	CD West 22.7	74.2
	1980	CD West 23.1	75.3
Western Samoa[c]	1961	CD West 18.5	63.8
	1966	CD West 19.4	66.1
	1971	CD West 20.0	67.6

Table 3. (*continued*)

Island group	Census year	Life tables[a] Source	e_0^f
Tonga	1966	CD West 19.5	66.3
	1976	CD West 21.9	72.3
Tuvalu	1979	Brass	60.4

a. In each row of the table, the indicated life tables were applied to data from the indicated census to generate own-children fertility estimates for each of the fifteen years previous to the census. In the sources, CD denotes Coale and Demeny (Coale and Demeny 1966).

b. Mortality estimates for each district or state were used in making the fertility estimates; fertility estimates for each of these two areas as a whole were constructed by aggregating estimates for their component parts, and therefore non-own factors were not computed.

c. Niue and Western Samoa 1971 used changing mortality, starting with the CD level given and decreasing by 0.1 level per year. Western Samoa 1961 and 1966 used a decrease of 0.2 level per year.

the usual Brass estimates and matching them to Coale–Demeny model life tables is built into the own-children computing package; see Midkiff and Choe 1978.) The level so obtained specified life tables that were then used to derive reverse-survival ratios (for details, see Retherford 1978 and Retherford and Cho 1978). For Solomon Islands, Tuvalu, and Kiribati, a somewhat different methodology developed by Brass was used (Brass 1971; Macrae 1980:142ff.; Kiribati, Ministry of Home Affairs and Decentralisation 1983; Solomon Islands, Ministry of Finance 1981).

In most of the applications, constant mortality was assumed during the fifteen-year estimation period previous to the census to which the own-children method was applied. In some cases, as indicated in the footnotes to Table 3, allowance was made for mortality decline over the estimation period. In Niue, it was simply assumed that the Model West level number increased by 0.1 per year over the estimation period. In Western Samoa, life tables at two different dates were interpolated to obtain life tables and reverse-survival ratios for intervening years. (For details of the interpolation procedure, see Retherford and Cho 1978.)

Some of the mortality estimates in Table 3 may be too low (life expectancy too high) because of a tendency for respondents to selectively omit mention of dead children when responding to the child survivorship questions. If such omissions occur, the reverse-survival factors for children tend to be too low, and the own-children fertility estimates tend to be biased downward. But at prevailing mortality levels (life expectancy in the neighborhood of 60 years), the reverse-survival factors are already close to one and are quite insensitive to errors of even several years of life expectancy.

(See Retherford, Chamratrithirong, and Wanglee 1980; in the case of Thailand, with an average life expectancy also around 60 years, it was found that a mortality estimation error as high as 16 years of life expectancy generated fertility estimation errors of 8 percent or less.) Hence the possible underestimation of mortality in some of the island groups considered here produces only a slight downward bias in the fertility estimates.

We obtained own-children estimates of age-specific marital birth rates in the following way: First, age-specific proportions currently married in five-year age groups were obtained from two or more censuses and linearly interpolated between censuses to get age-specific proportions currently married in five-year age groups in each intercensal year. Sometimes the estimated birth rates pertain to calendar years earlier than the earliest census from which age-specific proportions currently married are available. In this case, the trend lines for age-specific proportions currently married were extrapolated backward in time from the earlier of the two censuses. In this way we obtained for each geographic unit an array of age-specific proportions currently married, with age in five-year age groups along one dimension, and time in single calendar years (or midpoints of time periods) along the other dimension. The original own-children analysis provided a corresponding array of age-specific birth rates for all women. From these two matrices we obtained a third array of age-specific marital birth rates by dividing, term by term, the array of age-specific birth rates by the array of age-specific proportions currently married. This calculation assumes that all births occur within marriage. As discussed later, this assumption is only approximately met, and more so in some island groups than in others; violation of this assumption may introduce bias.

Marital total fertility rates (but not total fertility rates for all women) pertain only to ages 20–49. The MTFR including ages 15–19 is not a good measure because it weights the birth rate at ages 15–19, which in several of the island groups is high but based on relatively few married women because of moderately late marriage, to the same extent that it weights birth rates at older ages. Moreover, as we shall see, in some island groups the estimated age-specific marital birth rate at 15–19 is severely biased, and in others it follows a trend quite different from that at older ages. Thus a measure that accords undue weight to fertility at 15–19 can produce a distorted picture of overall marital fertility trends. We deal with this problem of computing the MTFR by summing age-specific marital birth rates over ages 20–49 instead of 15–49. MTFR trends are then more consistent with overall fertility trends, but at the cost of some loss of information.

We obtained age-specific proportions never married in the same way that we obtained age-specific proportions currently married. First, we obtained age-specific proportions never married in five-year age groups from

two or more censuses and linearly interpolated them between censuses to get age-specific proportions never married in five-year age groups at midpoints of intercensal time periods or subperiods. We used linear extrapolation when the time period fell outside the intercensal interval for which we had data for both end points. Each set of age-specific proportions never married so derived provided the basis for calculating a value of the singulate mean age at marriage (SMAM), which we have used as our summary measure of nuptiality. (SMAM actually reflects cohort as well as period nuptiality; for details of its calculation, see Shryock and Siegel 1973: vol. 1, p. 295.)

We also computed the Coale-Trussell m index of marital fertility control (Coale and Trussell 1974, 1975, 1978; a computer program developed by James Trussell at Princeton University's Office of Population Research was used for this purpose). This index measures the deviation from the typical age pattern of natural fertility, defined as fertility in the absence of deliberate family limitation, that results from deliberate family limitation. The m index depends on the shape of the age-specific marital fertility schedule, not on the level of marital fertility. In the natural fertility situation, the shape of the schedule is convex throughout the reproductive ages, whereas in the family limitation situation it is concave at the older reproductive ages. For purposes of constructing the m index, the standard age schedule of natural fertility is obtained as the arithmetic average of ten of the age-specific natural marital fertility schedules designated by Henry (1961). If the observed age-specific fertility schedule has the same shape as that of the standard age-specific natural fertility schedule, $m = 0$. If the observed schedule deviates from the standard schedule by an amount that is the average deviation of forty-three reasonably reliable marital fertility schedules in the early 1960s, representing a range of differences in the extent of fertility control, then $m = 1$. Values of m higher than 1 are also possible.

We did not adjust for incorrect enumeration (age-selective undercount or age misreporting) because the data necessary to compute adjustment factors were unavailable. If the undercount is proportionately the same for each sex at each age, however, the own-children fertility estimates are unaffected, since estimated numerators and denominators of birth rates are subject to the same multiplicative errors, which cancel. Age misreporting is potentially a more serious problem. A jagged up-and-down trend in annual fertility estimates may indicate the presence of age misreporting, in which case the estimates should be interpreted cautiously. However, if Myers's index is low, as is usually true in the South Pacific, the jagged trend may be real and partly due to the small size of the population under consideration, which means that large local fluctuations are less likely to average to a smooth trend for the nation as a whole.

The own-children fertility estimates may also be biased by migration. Many of the populations examined here have experienced high rates of out-migration in recent decades. If, before moving, out-migrants have about the same age-specific birth rates as nonmigrants, and if out-migrants take their children with them, then the own-children estimates of age-specific fertility for earlier years, based on nonmigrants present at the time of the census, should be about the same as if the migrants had actually been present. If women who migrate leave their children behind in the temporary care of relatives, however, the own-children fertility estimates will be biased upward, even if out-migrants and nonmigrants have identical age-specific fertility. In this case the children of migrants are treated as non-own and allocated to reverse-survived nonmigrant women.

If the own-children method is applied to two or more consecutive censuses, so that the estimated trends in fertility, marital fertility, and the *m* index overlap to some extent, then close agreement of the overlapping trends probably indicates that migration, as well as other sources of error such as age misreporting, is not a serious source of bias. If, say, the own-children fertility estimates are based on two censuses ten years apart, the own-children fertility estimates for a given year during the period of overlap are based on women who are approximately ten years older in the second census than the first. Since migration rates vary sharply by age, the overlapping estimates from the two consecutive censuses are not likely to be distorted to the same extent by migration. Therefore, if migration seriously distorts the own-children fertility estimates, one expects the agreement of the overlapping trends to be poor. In most of the populations examined in this paper, more than two censuses are available, so that overlapping trends of fertility estimates can be checked for consistency.

In comparing own-children estimates of fertility with estimates based on vital registration, we shall usually assume that the own-children estimates of the total fertility rate (TFR) are more accurate than comparable estimates based on vital registration, which are almost always lower. Estimates of birth rates based on both vital registration (birth rate numerators) and census data (birth rate denominators) tend to be biased downward when vital registration is incomplete, except in cases where the rate of census undercount is at least as great as the rate of underregistration. The own-children fertility estimates, on the other hand, tend to be affected little by census undercount. Census undercount tends to affect entire households, so that age-specific child–woman ratios are affected little. In this regard the own-children estimates of age-specific birth rates can be viewed as mortality-adjusted age-specific child–woman ratios. The comparisons between fertility estimates based alternatively on own children and vital registration are more valid when the data are aggregated over several calendar years. Aggregation tends to average out biases due to age misreporting.

FINDINGS

Findings are presented in Tables 4 and 5 and Figures 2–6, supplemented by Appendix Tables 1–3. The presentation of findings is by island group, where island groups are further grouped according to whether they are in Melanesia, Micronesia, or Polynesia (see Figure 1). Table 4 and Figures 2–6 show levels and trends of total fertility rates (TFRs), marital total fertility rates (MTFRs), age-specific birth rates (ASBRs), age-specific marital birth rates (ASMBRs), singulate mean ages at marriage (SMAM), and the *m* index of marital fertility control. Finally, Table 5 makes limited comparisons between fertility estimates derived by the own-children method and fertility estimates based on alternative sources, usually vital registration for births and census counts of women for birth rate denominators. Detailed age-specific birth rates, marital birth rates, and proportions currently married to supplement these tables and figures are given in Appendix Tables 1–3. The country-by-country summary that follows draws information from these and earlier tables and figures but usually omits specific reference to them in order to minimize repetition.

Melanesia

Only two island groups of Melanesia are considered here, Fiji and Solomon Islands.

Fiji

Fiji has the largest population of all the island groups considered in this paper, with almost 600,000 people in 1976. About half are indigenous Fijians, and the other half are Indians, originally brought in by the British as laborers. Fiji's land area is also comparatively large, so population density is moderate. The population has been growing at about 2 percent annually. At 1.02, the sex ratio slightly favors males. Myers's index of digit preference is 2.1, indicating reasonably accurate age reporting. Non-own factors are about twice as high for the Fijians as for the Indians, perhaps because of the tradition of adoption among Fijians. (Another possible explanation—differential rates of emigration between Fijians and Indians—is unlikely, because out-migration rates are much higher for Indians.) Life expectancy is about 68 years for both Fijians and Indians.

During the estimation period 1962–76, fertility declined substantially for both groups, especially during the 1960s, then leveled off somewhat in the first half of the 1970s. The decline in marital fertility for Indians was especially pronounced, the MTFR falling from about 7 to 4 between 1962 and 1976. These values would be higher if our MTFR calculation did not exclude fertility at ages 15–19. This exclusion also explains why the TFR in Table 4, which includes ages 15–19, sometimes exceeds the MTFR.

Table 4. Total fertility rates, marital total fertility rates, singulate mean ages at marriage, and values of the *m* index of marital fertility control (rates per woman)

Island group	Census[a] year	Period of estimate[b]	TFR	MTFR	SMAM	*m*
Melanesia						
Fiji						
Fijians	1976	1962–66	5.95	7.40	22.4	.37
		1967–71	5.16	6.48	22.4	.40
		1972–76	4.53	5.84	22.2	.56
Indians	1976	1962–66	6.28	6.28	19.7	.49
		1967–71	4.40	4.65	20.5	.83
		1972–75	3.55	4.00	20.9	1.15
Solomon Islands	1976	1967–71	6.97	8.56	22.6	.14
		1972–76	7.66	9.02	21.6	.09
Micronesia						
Guam	1980	1966–70	4.24	5.02	21.1	.30
		1971–75	3.55	4.24	21.5	.62
		1976–80	3.02	3.71	21.9	.92
Kiribati	1978	1964–68	6.85	7.85	19.7	.16
		1969–73	5.13	6.04	20.1	.30
		1974–78	4.51	5.51	20.6	.48
TTPI	1967	1953–57	6.87	7.88	21.5	.36
		1958–62	7.40	8.85	21.8	.36
		1963–67	7.08	8.85	22.1	.31
	1973	1959–63	7.39	8.28	21.1	.32
		1964–68	7.76	9.02	21.4	.17
		1969–73	7.36	8.85	21.7	.16
	1980	1966–70	7.41	8.73	21.5	.18
		1971–75	6.91	8.36	21.8	.13
		1976–80	6.28	7.80	22.1	.20
NMI	1973	1959–63	8.00	9.11	22.1	.33
		1964–68	7.68	9.11	22.4	.37
		1969–73	6.20	7.67	22.8	.50
	1980	1966–70	6.81	8.20	22.5	.32
		1971–75	4.90	6.18	22.9	.41
		1976–80	4.24	5.49	23.2	.80
Marshalls	1973	1959–63	7.92	8.88	20.8	.30
		1964–68	8.72	9.85	20.8	.19
		1969–73	8.42	9.64	20.8	.14

Table 4. (*continued*)

Island group	Census[a] year	Period of estimate[b]	TFR	MTFR	SMAM	*m*
	1980	1966–70	8.14	9.26	20.8	.25
		1971–75	7.92	8.94	20.8	.16
		1976–80	7.88	8.87	20.8	.14
Palau	1973	1959–63	8.25	10.07	22.0	-.01
		1964–68	8.47	10.88	22.8	-.17
		1969–73	6.62	8.99	23.7	.10
	1980	1966–70	7.42	9.76	23.2	.01
		1971–75	6.26	8.64	24.0	.14
		1976–80	4.23	6.57	24.8	.50
FSM	1973	1959–63	6.90	7.47	20.7	.38
		1964–68	7.27	8.29	21.0	.17
		1969–73	7.34	8.73	21.4	.12
	1980	1966–70	7.06	8.16	21.2	.12
		1971–75	7.10	8.56	21.5	.07
		1976–80	6.50	8.11	21.9	.10
Ponape & Kosrae	1973	1959–63	7.47	8.27	20.8	.31
		1964–68	7.78	9.09	21.2	.10
		1969–73	7.74	9.32	21.7	.15
	1980	1966–70	7.58	9.04	21.4	.22
		1971–75	7.40	8.98	21.9	.14
		1976–80	6.74	8.45	22.4	.19
Truk	1973	1959–63	6.78	7.15	20.8	.34
		1964–68	7.16	7.95	21.0	.22
		1969–73	7.40	8.67	21.2	.09
	1980	1966–70	7.28	8.24	21.1	.11
		1971–75	7.17	8.55	21.3	.01
		1976–80	6.68	8.28	21.5	-.02
Yap	1973	1959–63	5.89	6.87	20.4	.88
		1964–68	6.23	7.42	20.7	.28
		1969–73	6.01	7.32	21.0	.16
	1980	1966–70	6.14	7.19	20.8	.19
		1971–75	5.98	7.40	21.2	.10
		1976–80	5.01	6.31	21.5	.40
Polynesia						
Niue[c]	1976	1967–71	7.53	(11.52)	(24.7)	(1.10)
		1972–76	5.26	(8.34)	(24.9)	(1.24)
American Samoa	1974	1960–64	6.49	8.44	23.2	.23
		1965–69	6.48	8.45	23.2	.18
		1970–74	5.46	7.28	23.2	.21

Table 4. (*continued*)

Island group	Census[a] year	Period of estimate[b]	TFR	MTFR	SMAM	*m*
	1980	1966–70	6.21	8.03	23.2	.20
		1971–75	5.12	6.86	23.2	.30
		1976–80	4.67	6.47	23.8	.44
Western Samoa	1961	1947–51	8.08	10.96	22.9	-.22
		1952–56	8.36	10.93	22.4	-.21
		1957–61	8.30	10.49	21.8	-.19
	1966	1952–56	8.15	10.66	22.3	.18
		1957–61	8.73	10.92	21.8	.15
		1962–66	8.14	10.25	20.9	.07
	1971	1957–61	8.59	10.70	21.8	.27
		1962–66	8.46	10.57	20.9	.10
		1967–71	7.78	9.60	21.1	.17
Tonga	1966	1952–56	6.49	10.40	25.2	.30
		1957–61	6.61	9.92	24.7	.21
		1962–66	7.16	10.00	24.2	-.04
	1976	1962–66	6.16	8.70	24.2	.17
		1967–71	6.15	8.65	24.0	.28
		1972–76	4.66	6.81	24.2	.39
Tuvalu	1979	1965–69	4.99	7.40	23.4	.45
		1970–74	3.31	5.38	24.0	.80
		1975–79	2.80	4.97	24.9	1.05

a. The census to which the own-children method was applied.

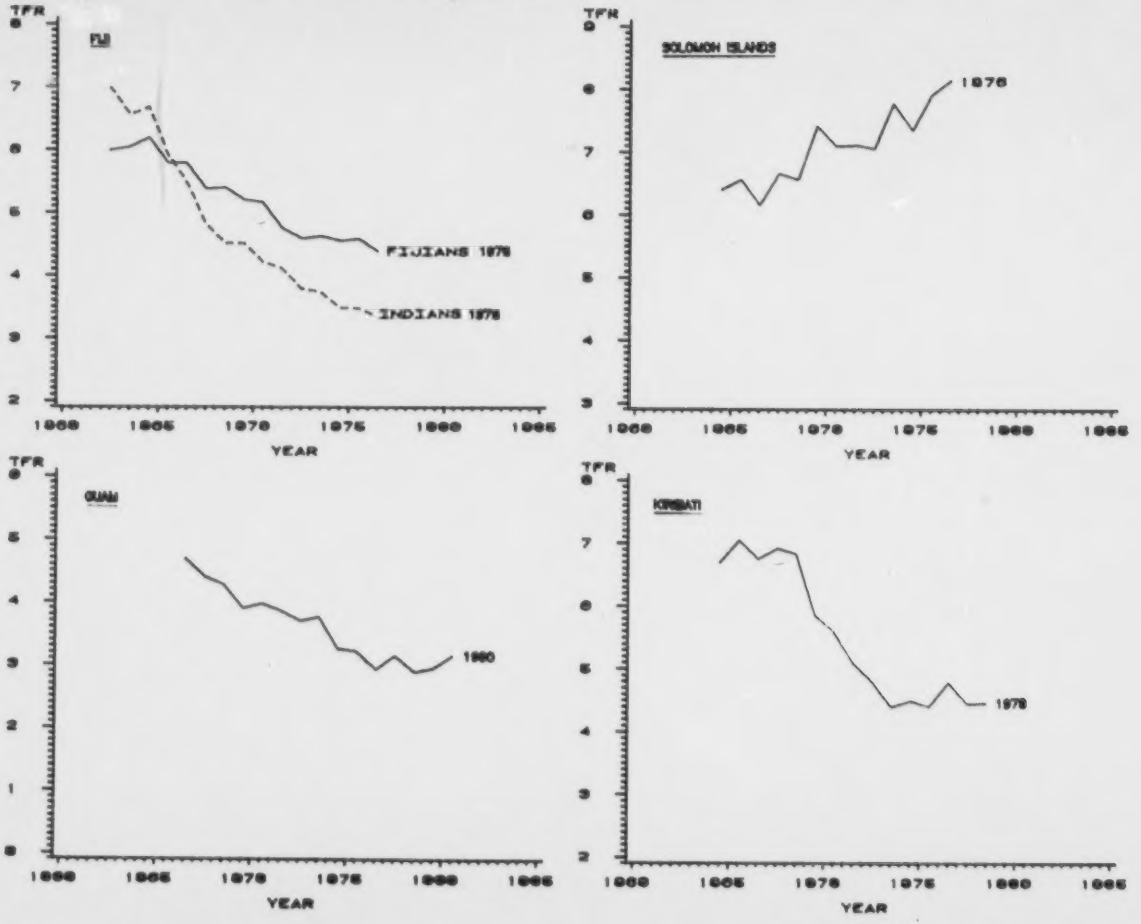
b. Indicates the time period to which the fertility estimates pertain.

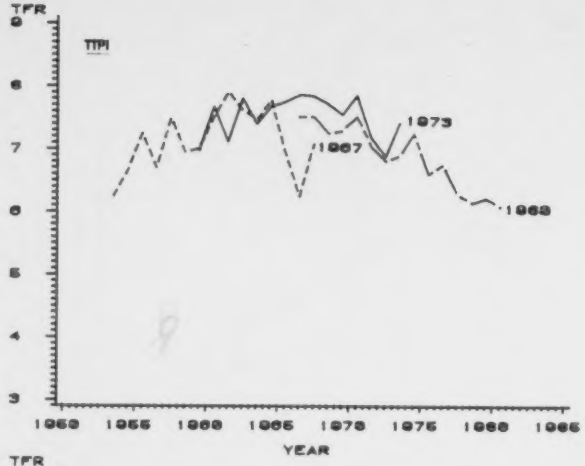
c. Numbers in parentheses are probably severely biased, as explained in the text.

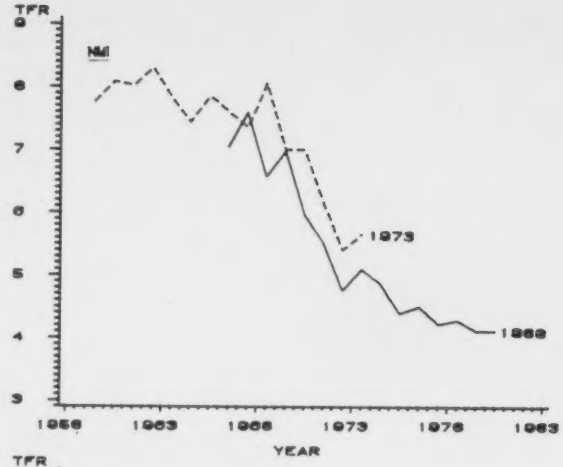
During the estimation period, age at first marriage remained virtually unchanged for Fijians at slightly above 22 years, but rose substantially for Indians—from about 18 years in 1956 to 21 years in 1976. Age-specific birth rates and age-specific marital birth rates fell at all ages for both Fijians and Indians, indicating that birth control was being adopted for spacing as well as for limiting purposes. This is perhaps to be expected (at least for Fijians), since conscious birth spacing is a traditional practice that predates fertility transition in many Pacific populations (Nag 1962). The *m* index of fertility control increased substantially for both Fijians and Indians, especially the latter. The *m* index rose rapidly after 1960 for Indians and after 1970 or so for Fijians. The fact that Fijian marital fertility nevertheless started falling well before 1970 suggests that Fijians initially adopted birth control as much for spacing as for limiting births. Fiji has had an active family planning

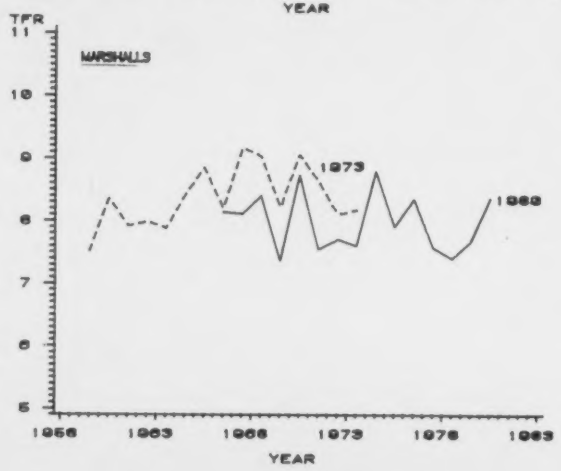
(*Continued on page 44*)

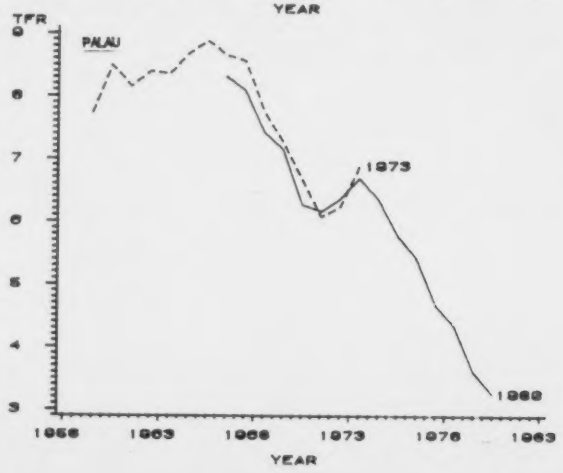
Figure 2. Annual total fertility rates

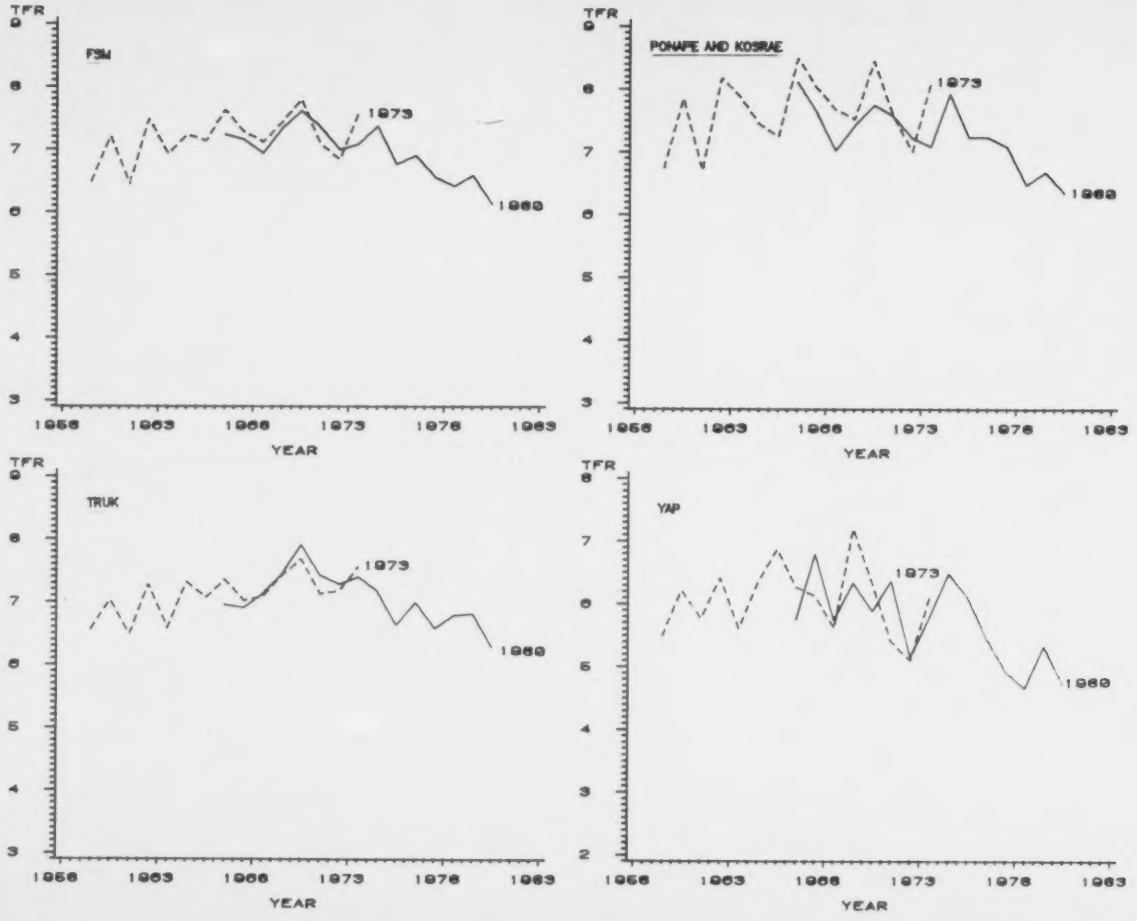


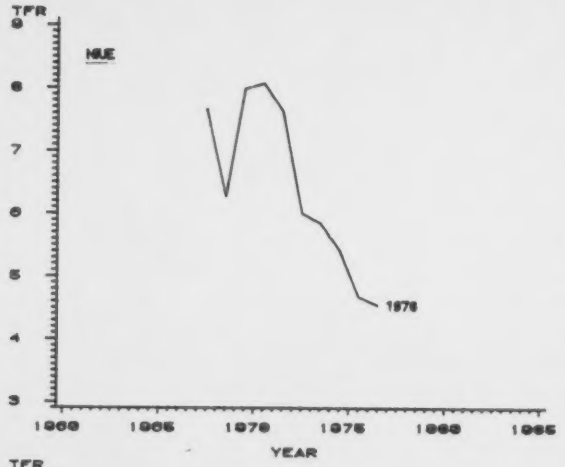

TFR
TTPI
1973
1967
1988
YEAR

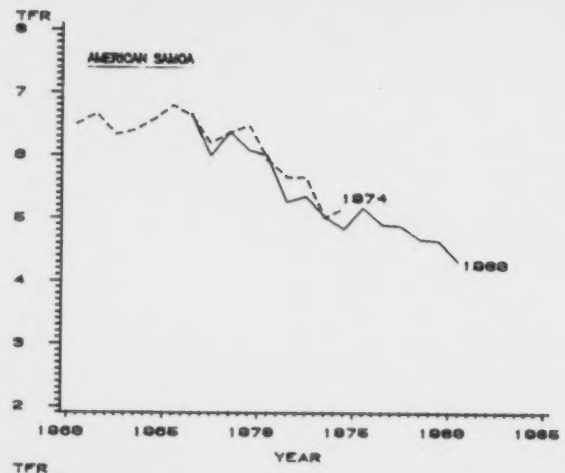

TFR
NMI
1973
1988
YEAR

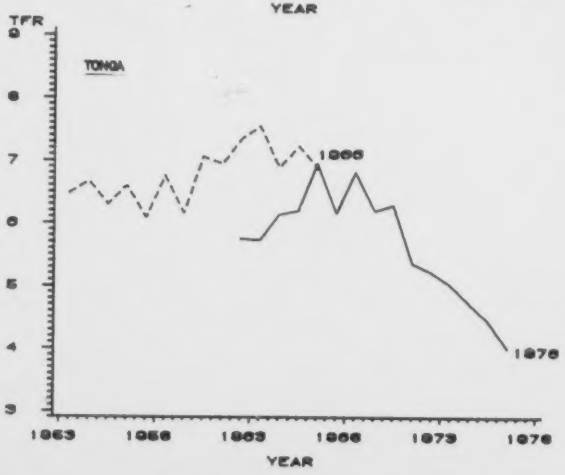

TFR
MARSHALLS
1973
1988
YEAR

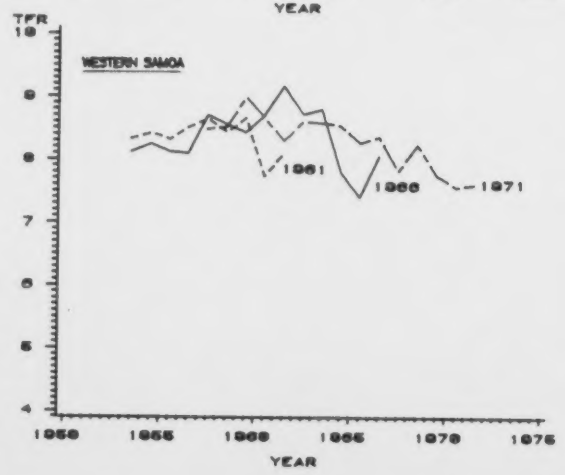

TFR
PALAU
1973
1988
YEAR

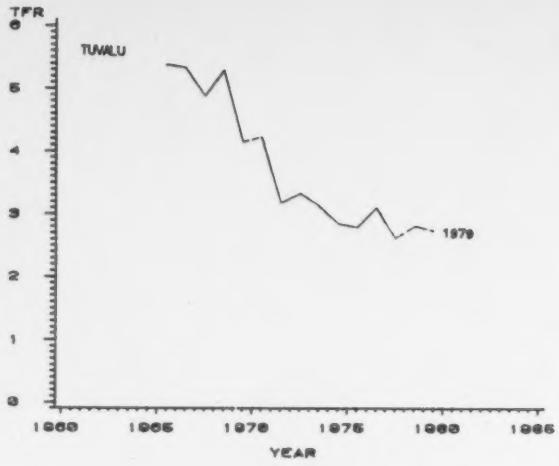

TFR
FSM
1973
1980
1956
1963
1966
1973
1976
1983
YEAR
TFR
PONAPE AND KOSRAE
1973
1980
1956
1963
1966
1973
1976
1983
YEAR
TFR
TRUK
1973
1980
1956
1963
1966
1973
1976
1983
YEAR
TFR
YAP
1973
1980
1956
1963
1966
1973
1976
1983
YEAR


TFR
NIUE
1976
YEAR


TFR
AMERICAN SAMOA
1974
1966
YEAR


TFR
TONGA
1966
1976
YEAR

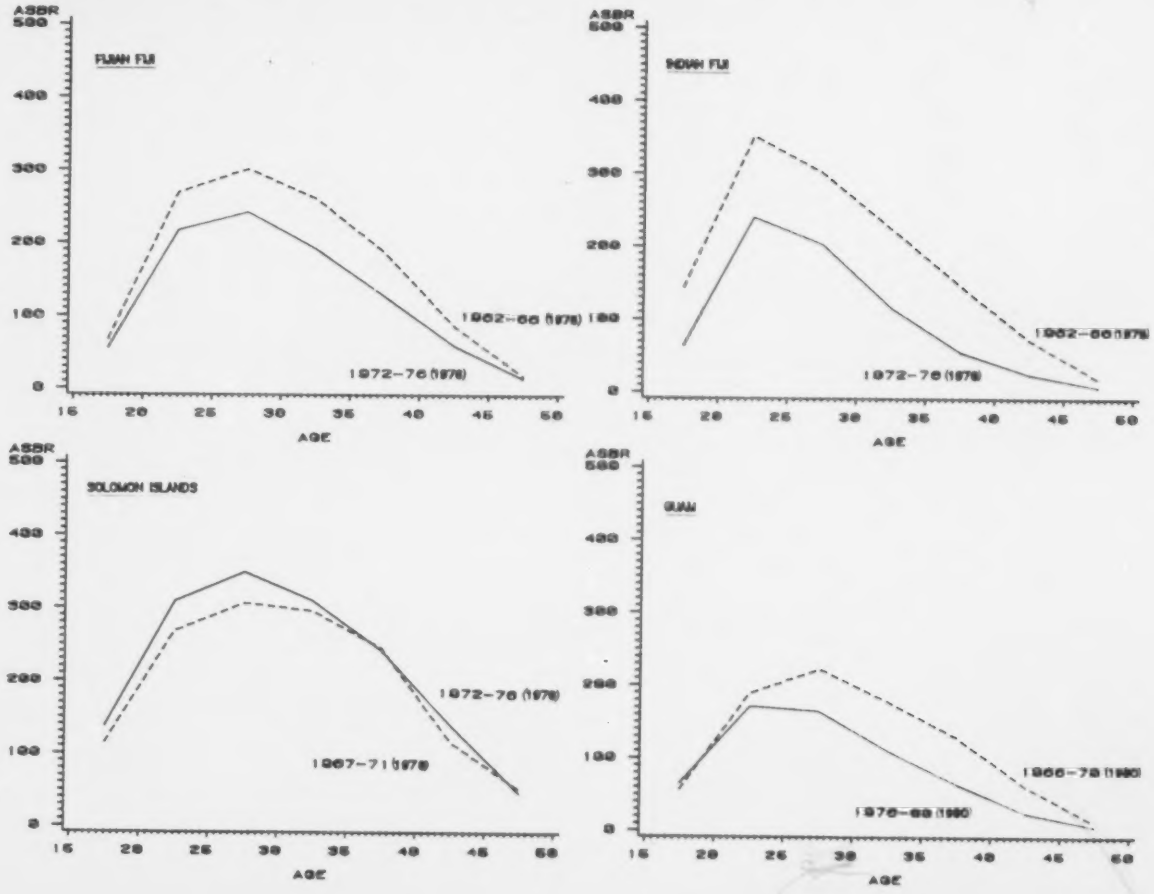

TFR
WESTERN SAMOA
1961
1966
1971
YEAR

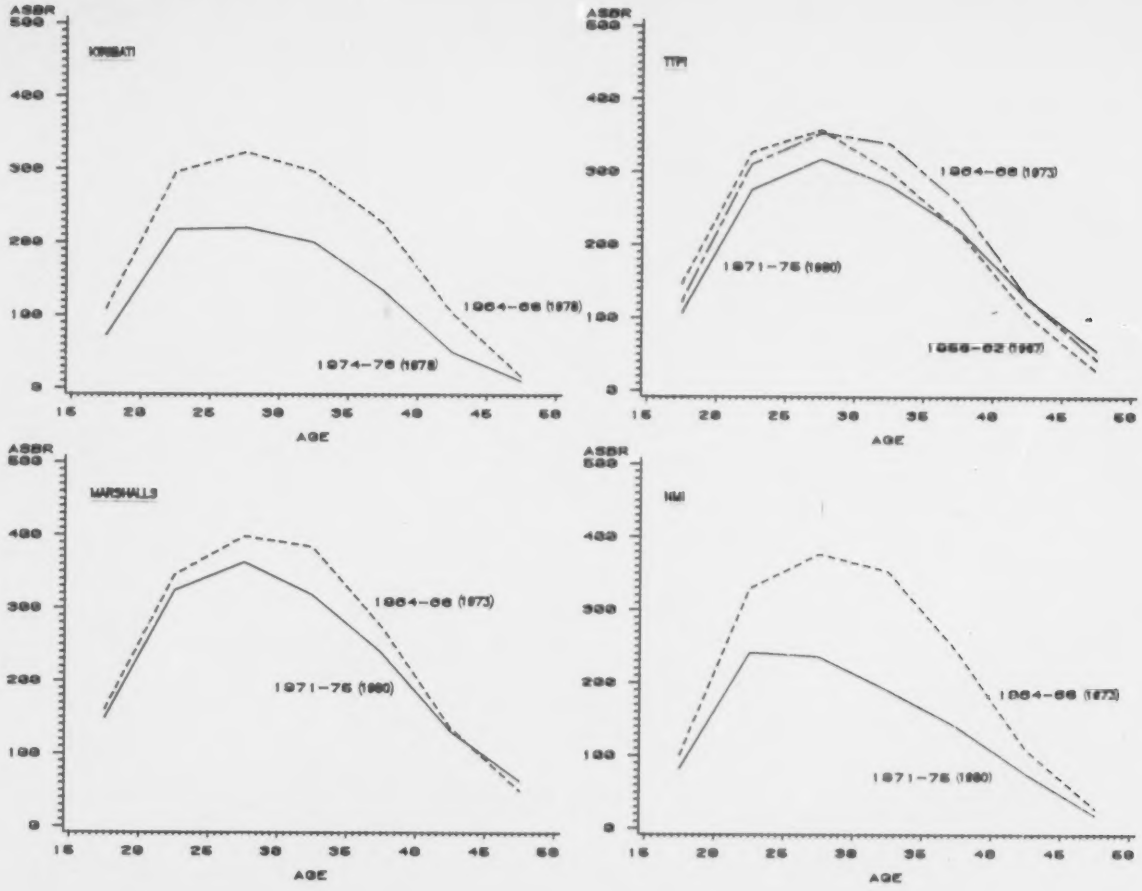


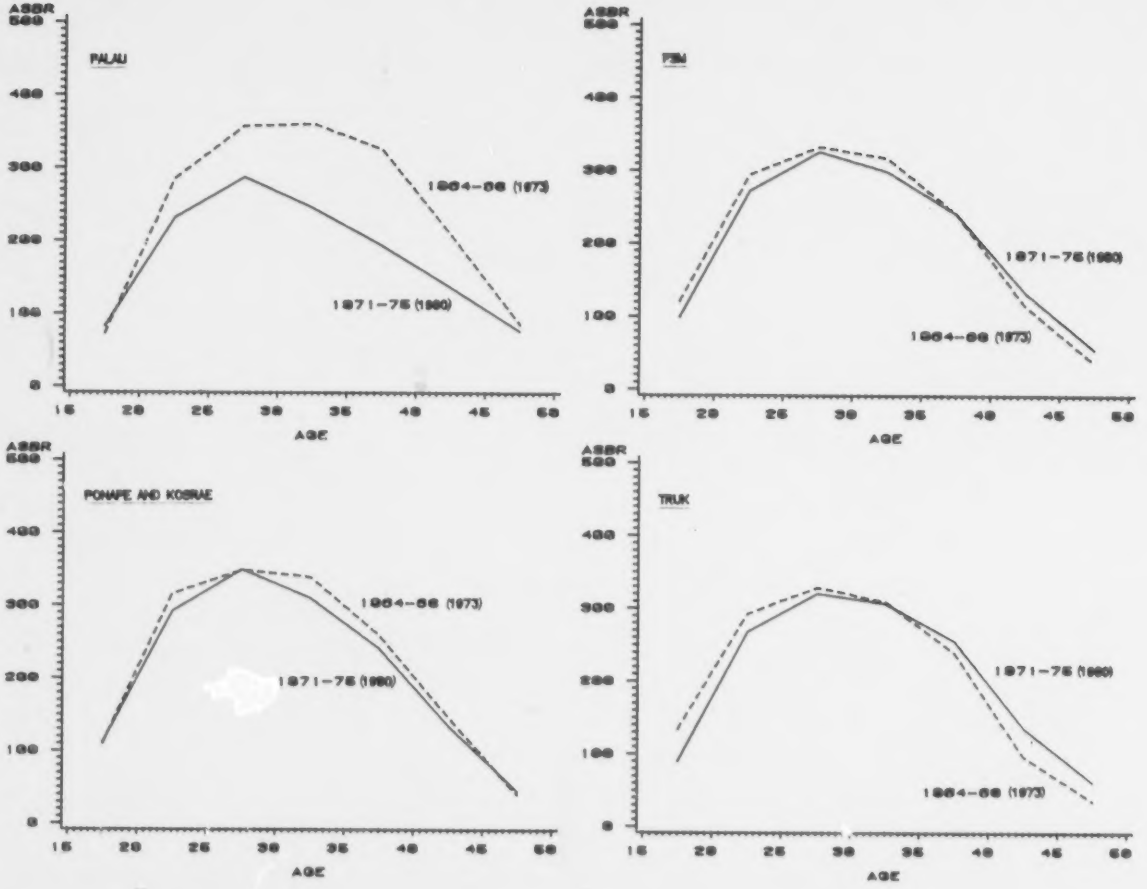
Source: Unpublished tabulations.

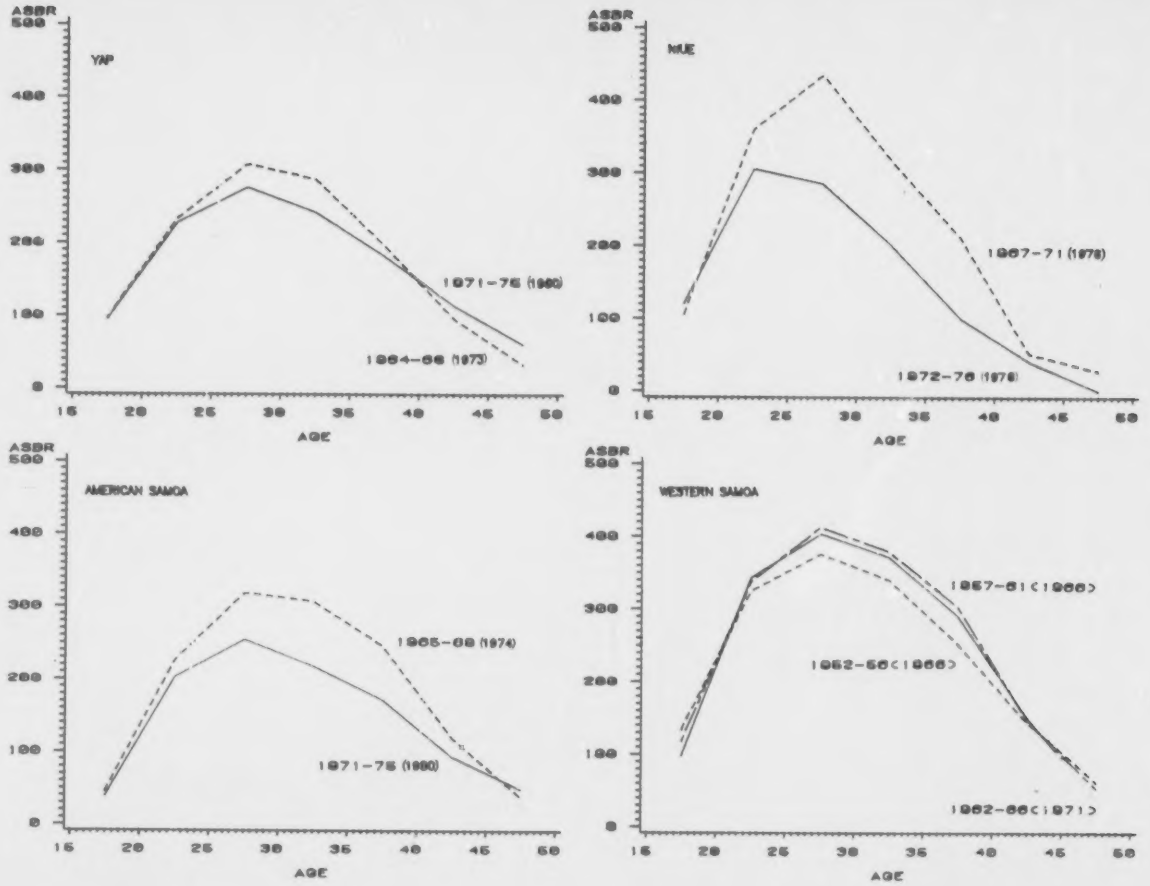
Note: Each census provides fifteen years of annual estimates based on own-children tabulations. The census year corresponding to each trend line is indicated on the graphs. Two or more censuses provide two or more partially overlapping time series of estimates.

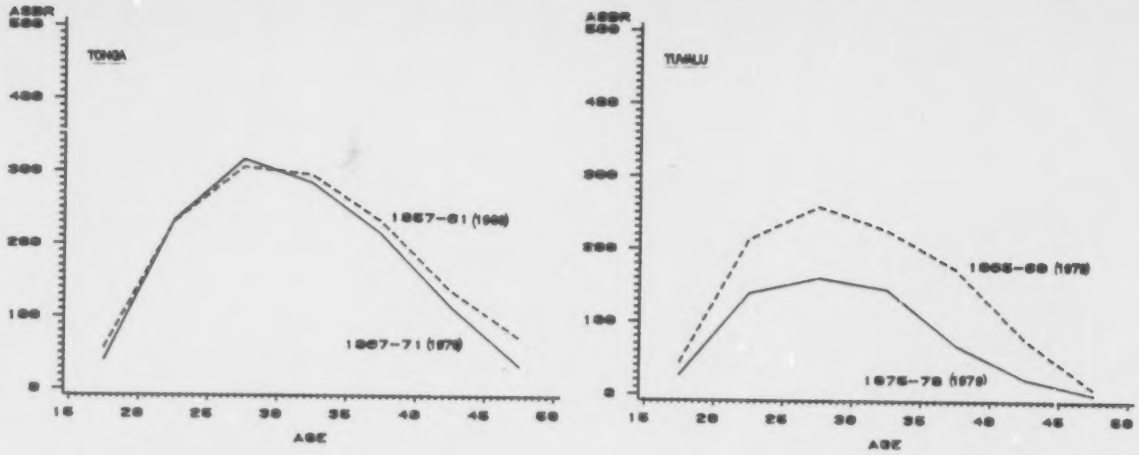
Figure 3. Age-specific birth rates




KIRIBATI
ASBR
500
400
300
200
100
0
15 20 25 30 35 40 45 50
AGE
1964-68 (1978)
1974-78 (1978)
TUVALU
1964-68 (1973)
1971-75 (1980)
1956-62 (1967)
MARSHALLS
1964-68 (1973)
1971-75 (1980)
NAURU
1964-68 (1973)
1971-75 (1980)


PALAU
1964–68 (1973)
1971–75 (1980)
FSM
1971–75 (1980)
1964–68 (1973)
PONAPE AND KOSRAE
1964–68 (1973)
1971–75 (1980)
TRUK
1971–75 (1980)
1964–68 (1973)
ASBR
AGE

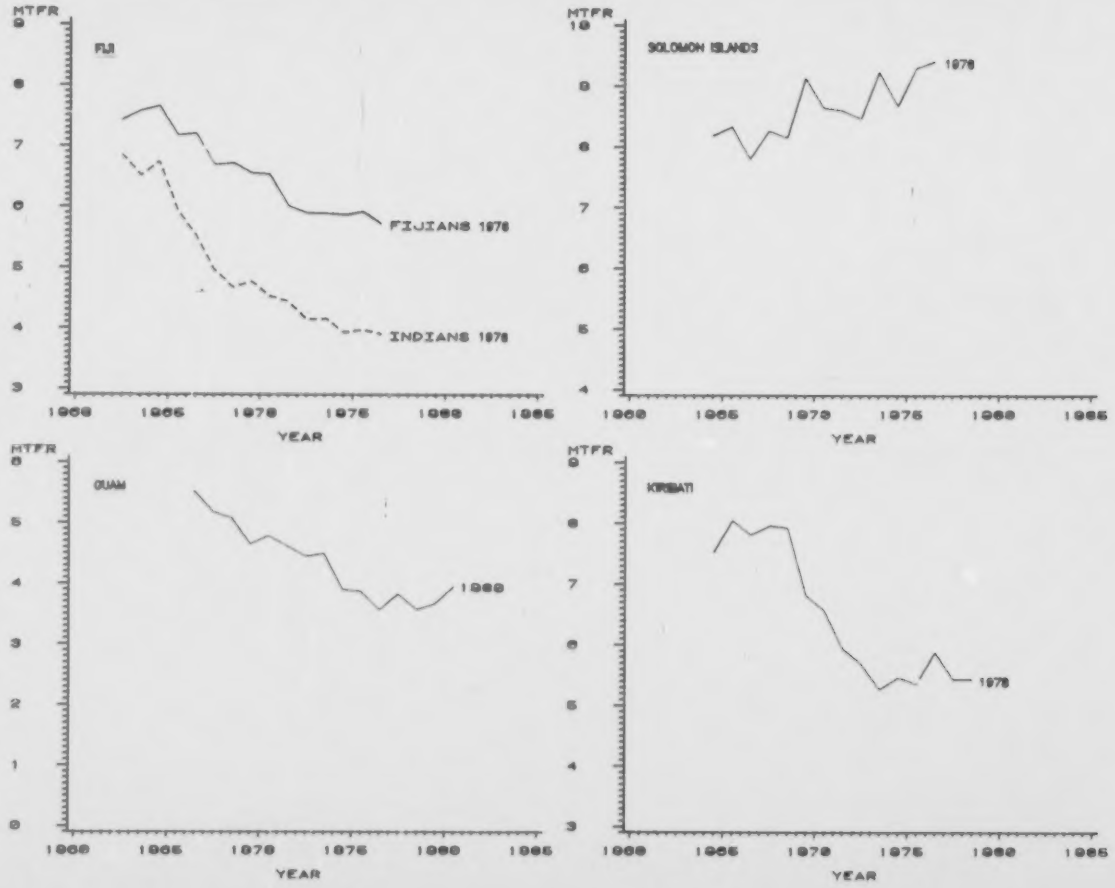

YAP
ASBR
500
400
300
200
100
0
1971-75 (1980)
1964-68 (1973)
15 20 25 30 35 40 45 50
AGE
NIUE
1967-71 (1976)
1972-76 (1976)
AMERICAN SAMOA
1965-69 (1974)
1971-75 (1980)
WESTERN SAMOA
1957-61 (1966)
1962-66 (1966)
1962-66 (1971)



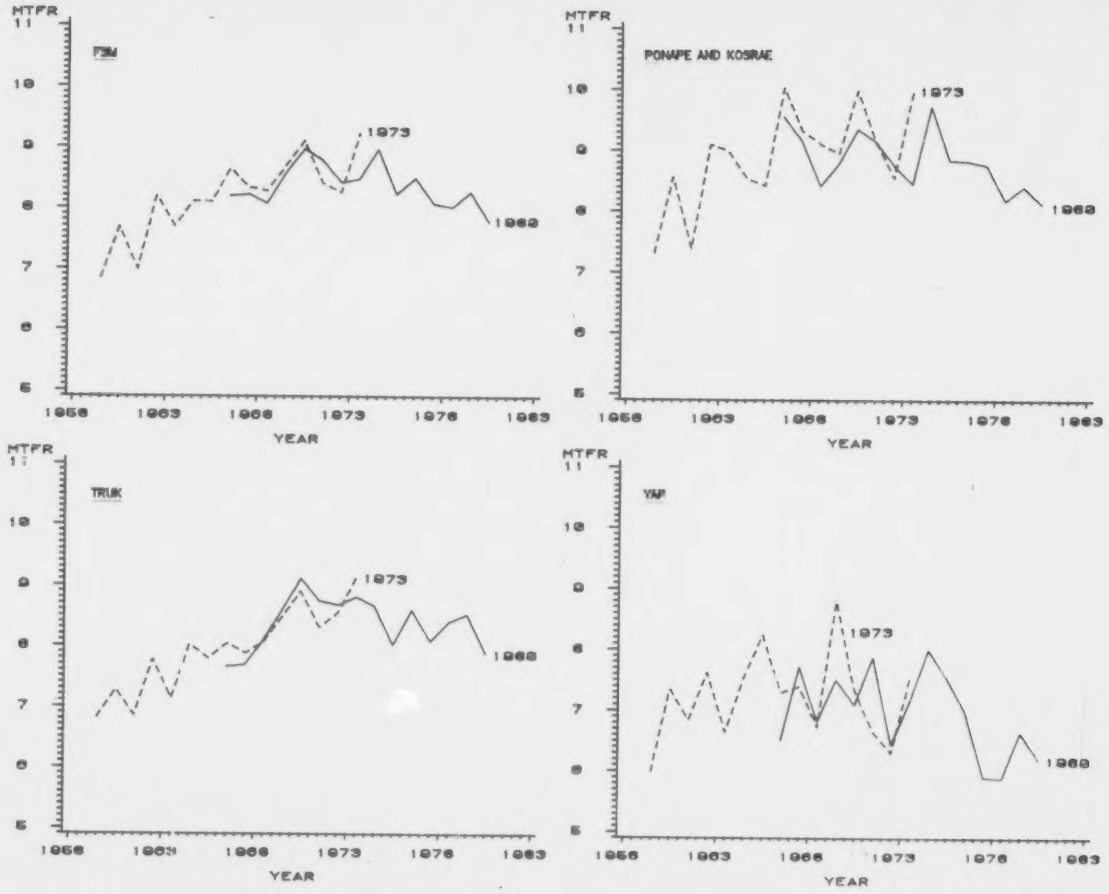
Source: Appendix Table 1.

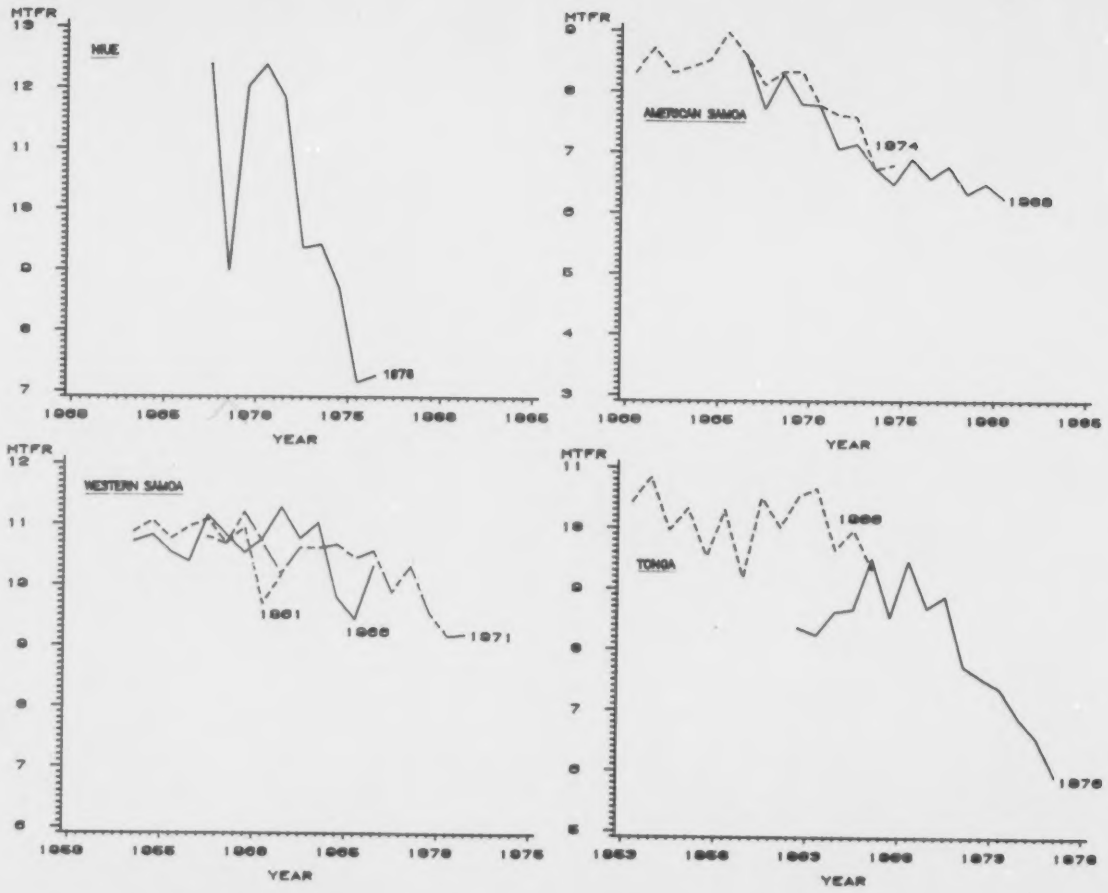
Note: In this and subsequent figures, years in parentheses indicate the census on which own-children fertility estimates are based.

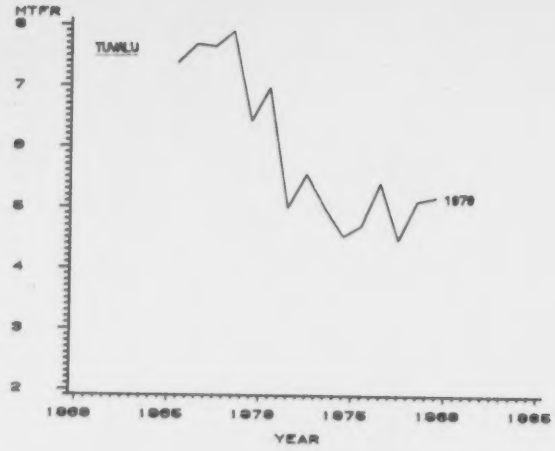
Figure 4. Annual marital total fertility rates



TTPI
1967
1973
1988
MTFR
10
9
8
7
6
5
4
1960 1965 1968 1970 1975 1980 1985
YEAR
NMI
1973
1988
MTFR
10
9
8
7
6
5
4
1960 1965 1968 1970 1975 1980 1985
YEAR
MARSHALLS
1973
1988
MTFR
11
10
9
8
7
6
5
1960 1965 1968 1970 1975 1980 1985
YEAR
PALAU
1973
1988
MTFR
12
10
8
6
4
2
1960 1965 1968 1970 1975 1980 1985
YEAR

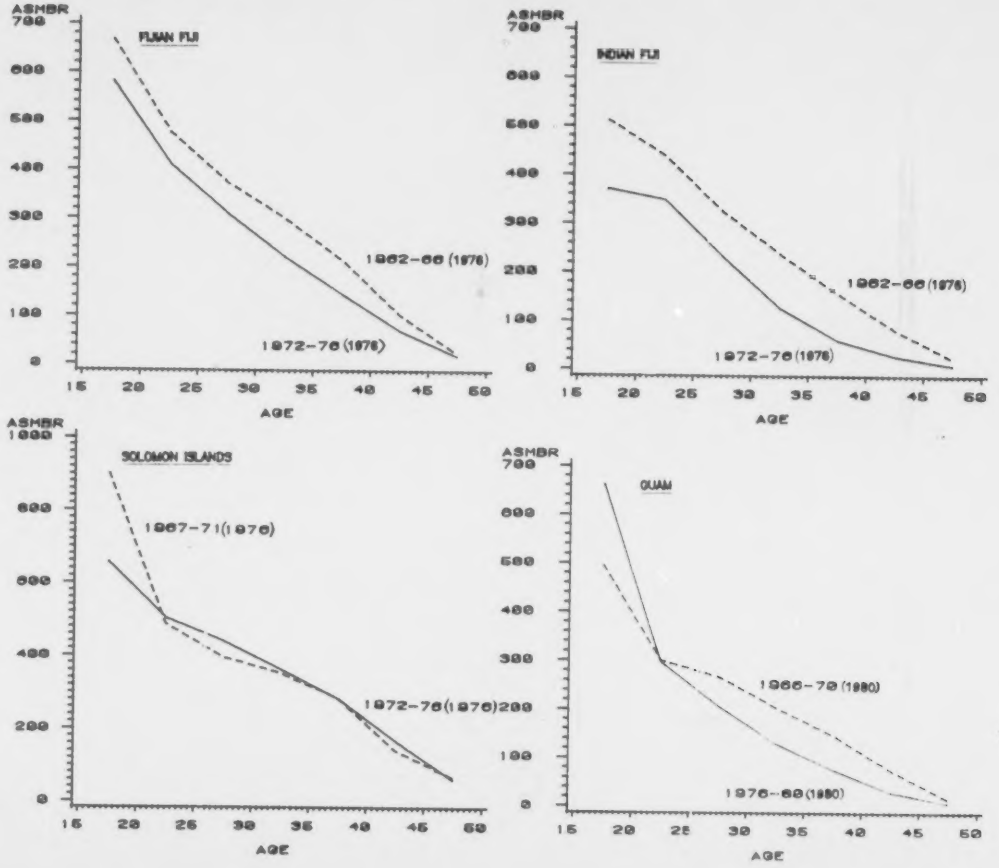

MTFR
FSM
1973
1968
YEAR
MTFR
PONAPE AND KOSRAE
1973
1968
YEAR
MTFR
TRUK
1973
1968
YEAR
MTFR
YAP
1973
1968
YEAR

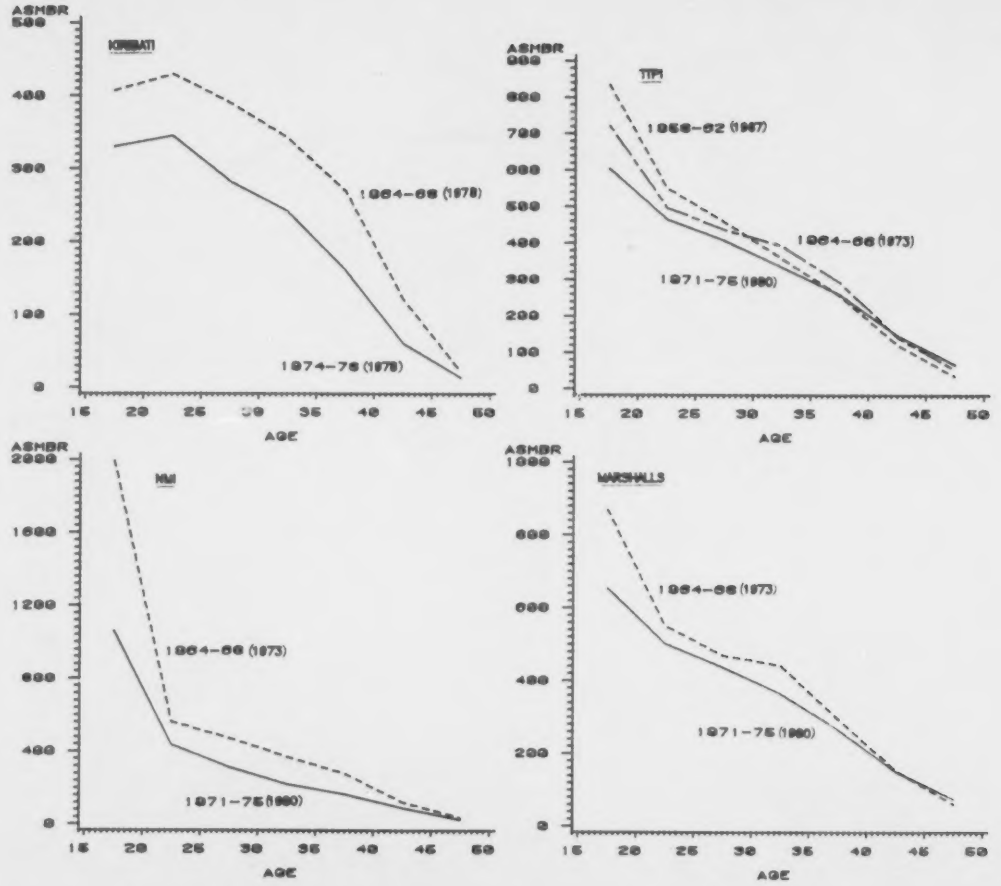

NIUE
1976
AMERICAN SAMOA
1974
1968
WESTERN SAMOA
1961
1966
1971
TONGA
1966
1976
MTFR
YEAR

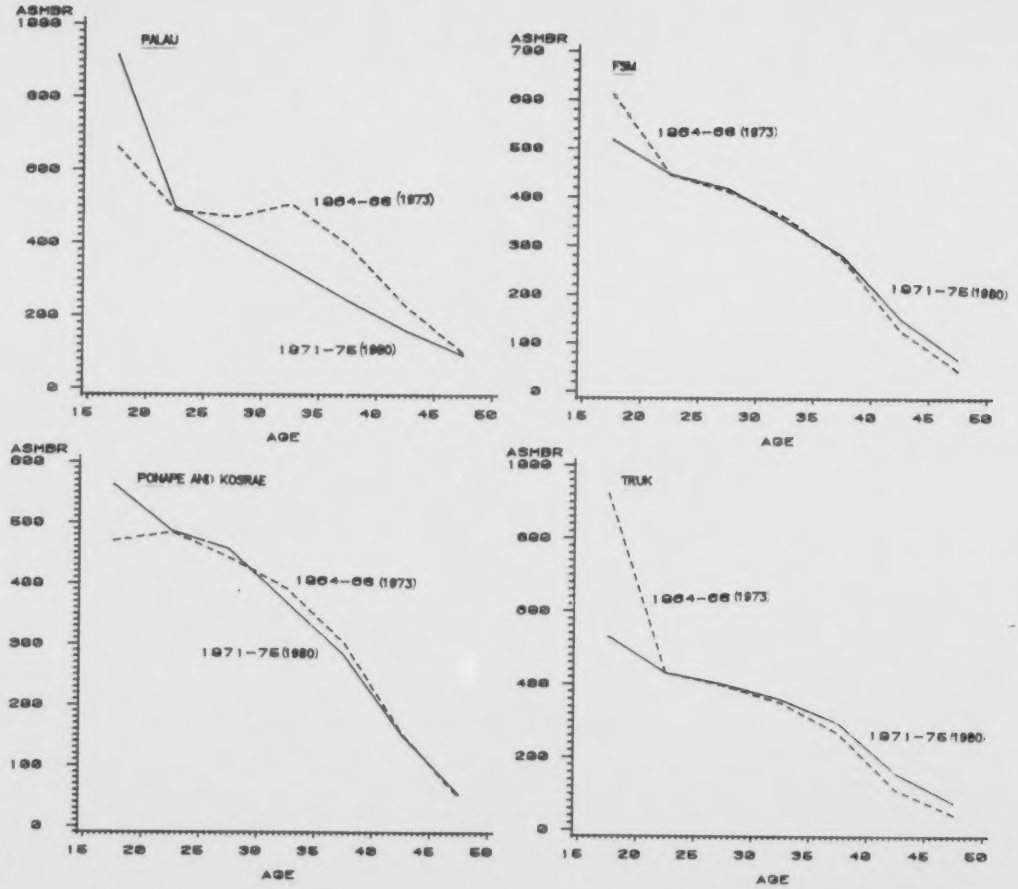


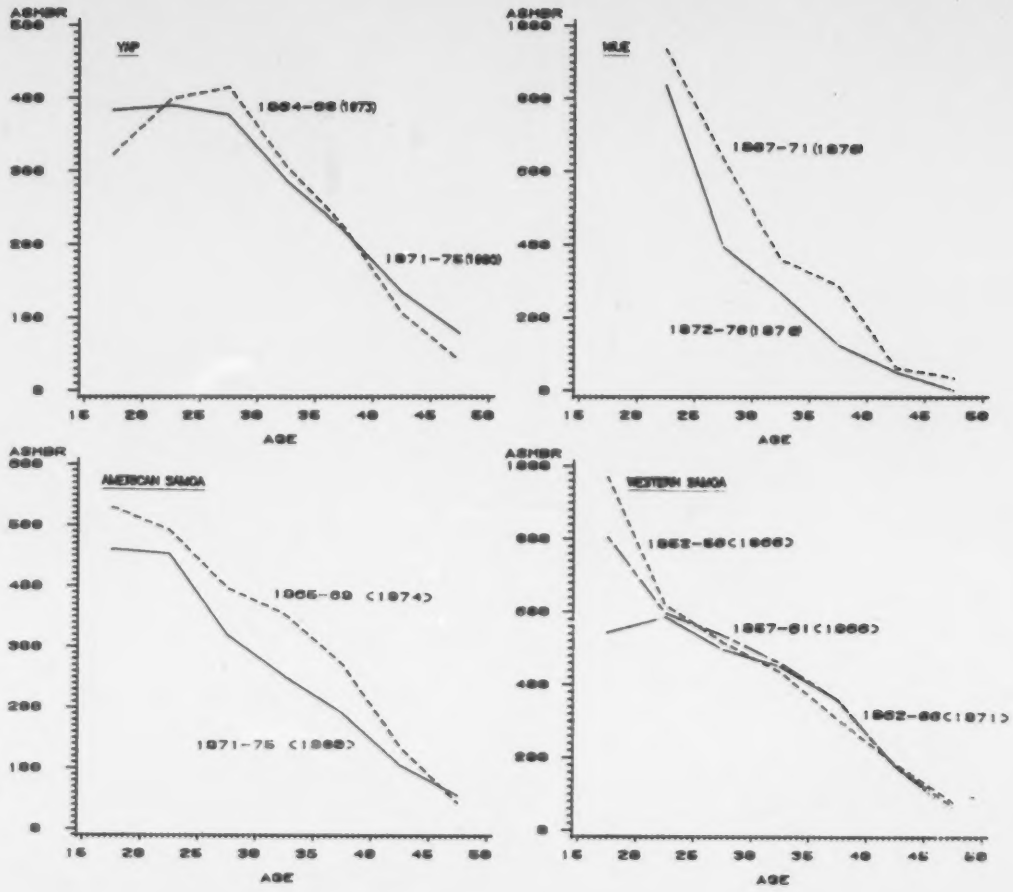
Source: Unpublished tabulations.

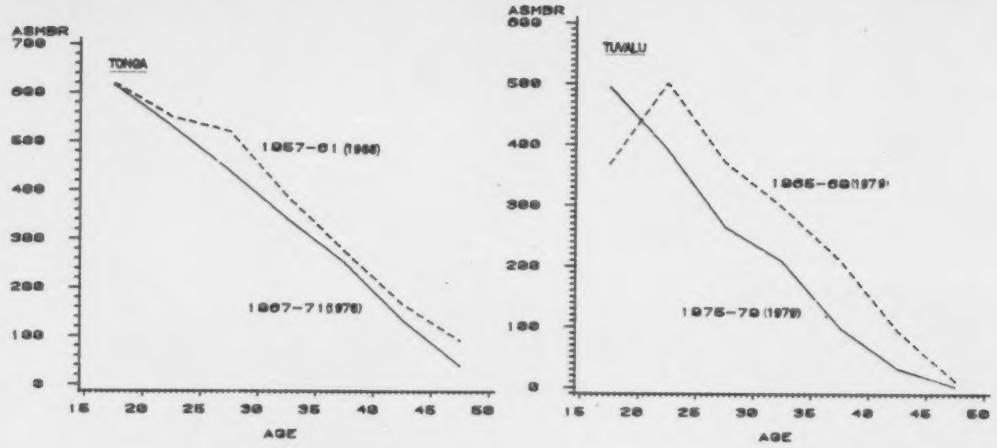
Figure 5. Age-specific marital birth rates




KIRIBATI
ASMBR
500
400
300
200
100
0
1964–68 (1978)
1974–75 (1978)
15 20 25 30 35 40 45 50
AGE
TIPI
ASMBR
800
700
600
500
400
300
200
100
0
1958–62 (1967)
1964–68 (1973)
1971–75 (1980)
15 20 25 30 35 40 45 50
AGE
NMI
ASMBR
2000
1600
1200
800
400
0
1964–68 (1973)
1971–75 (1980)
15 20 25 30 35 40 45 50
AGE
MARSHALLS
ASMBR
1000
800
600
400
200
0
1964–68 (1973)
1971–75 (1980)
15 20 25 30 35 40 45 50
AGE

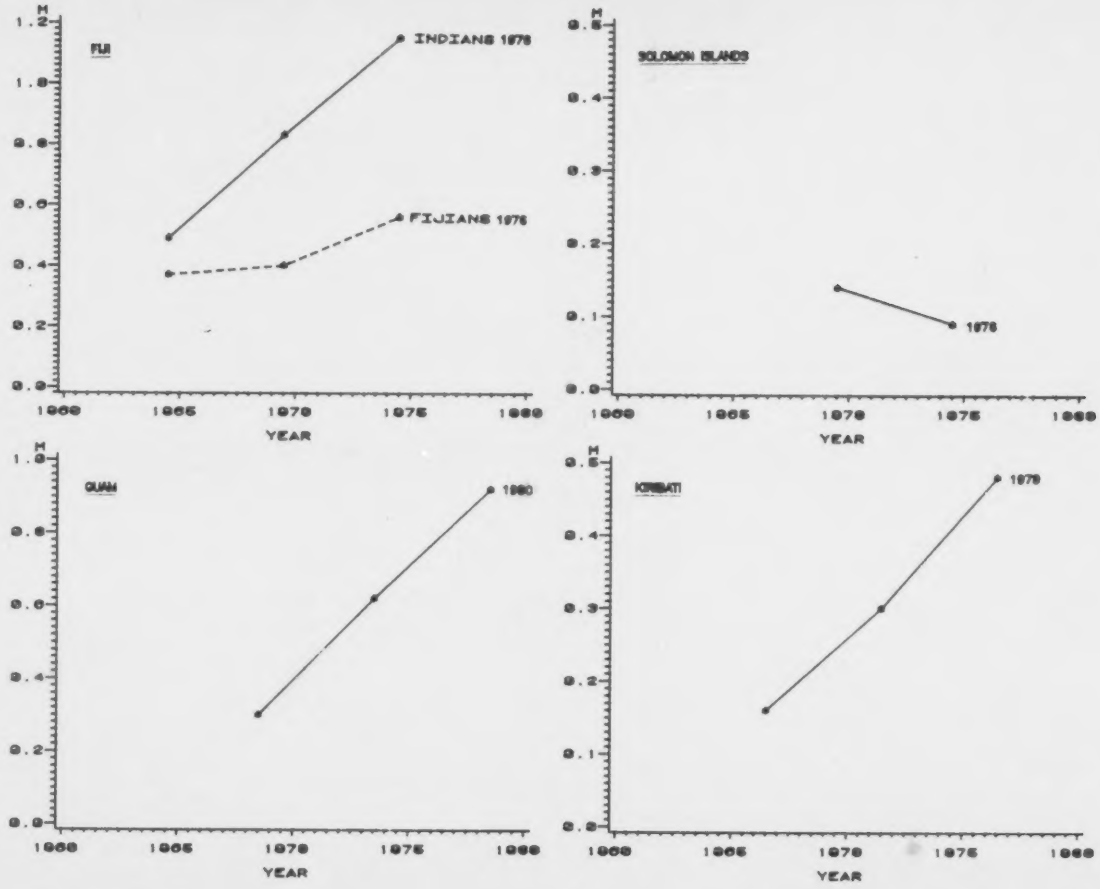

ASMBR
1000
800
600
400
200
0
PALAU
1964-66 (1973)
1971-75 (1980)
15 20 25 30 35 40 45 50
AGE
ASMBR
700
600
500
400
300
200
100
0
FSM
1964-66 (1973)
1971-75 (1980)
15 20 25 30 35 40 45 50
AGE
ASMBR
600
500
400
300
200
100
0
PONAPE AND KOSRAE
1964-66 (1973)
1971-75 (1980)
15 20 25 30 35 40 45 50
AGE
ASMBR
1000
800
600
400
200
0
TRUK
1964-66 (1973)
1971-75 (1980)
15 20 25 30 35 40 45 50
AGE

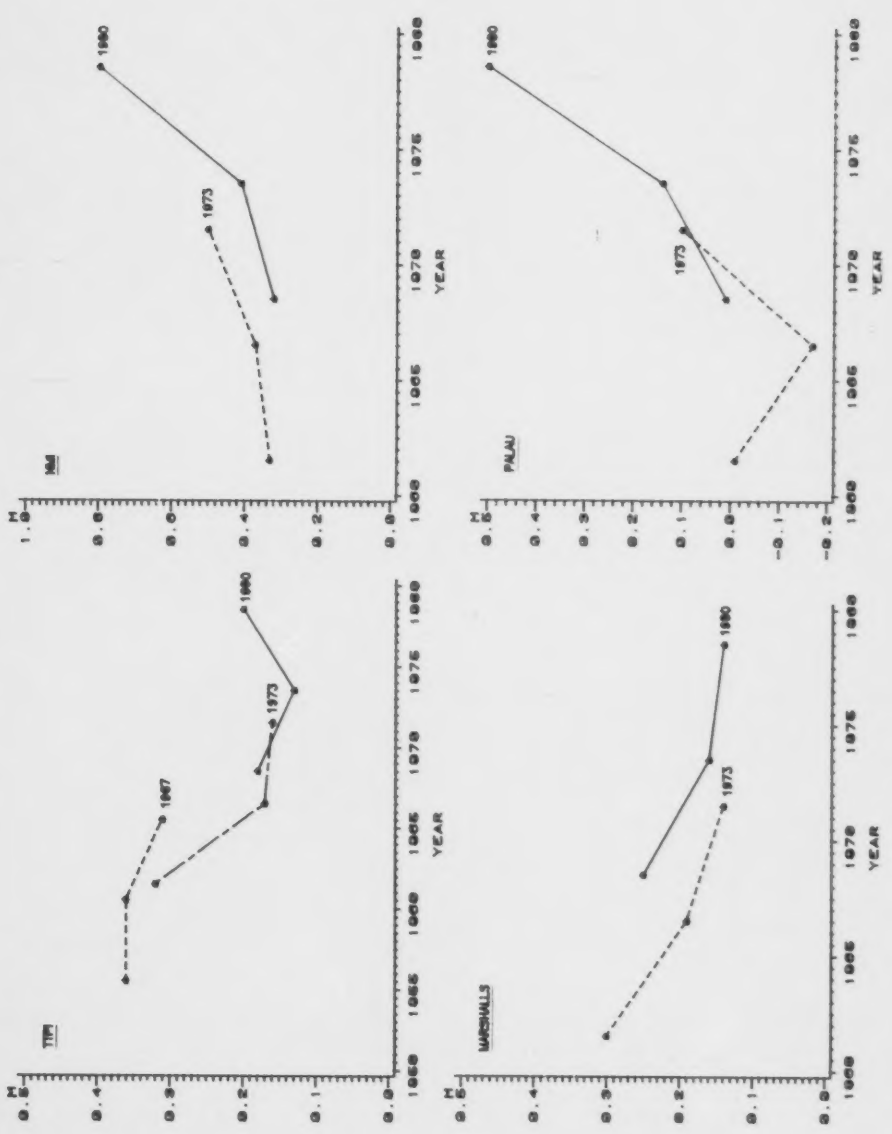

ASMBR
YAP
1964-68 (1973)
1971-75 (1980)
AGE
NIUE
1967-71 (1976)
1972-76 (1976)
AMERICAN SAMOA
1965-69 (1974)
1971-75 (1980)
WESTERN SAMOA
1962-66 (1966)
1967-81 (1966)
1962-66 (1971)

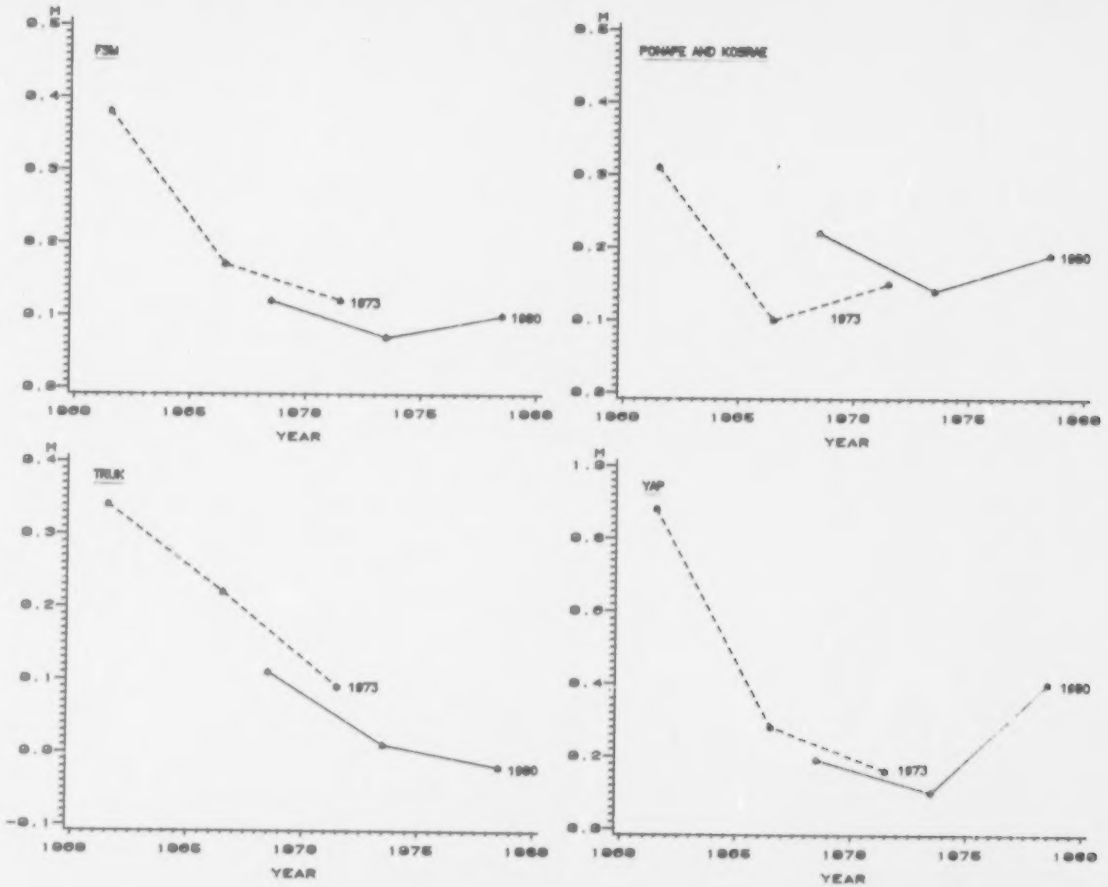


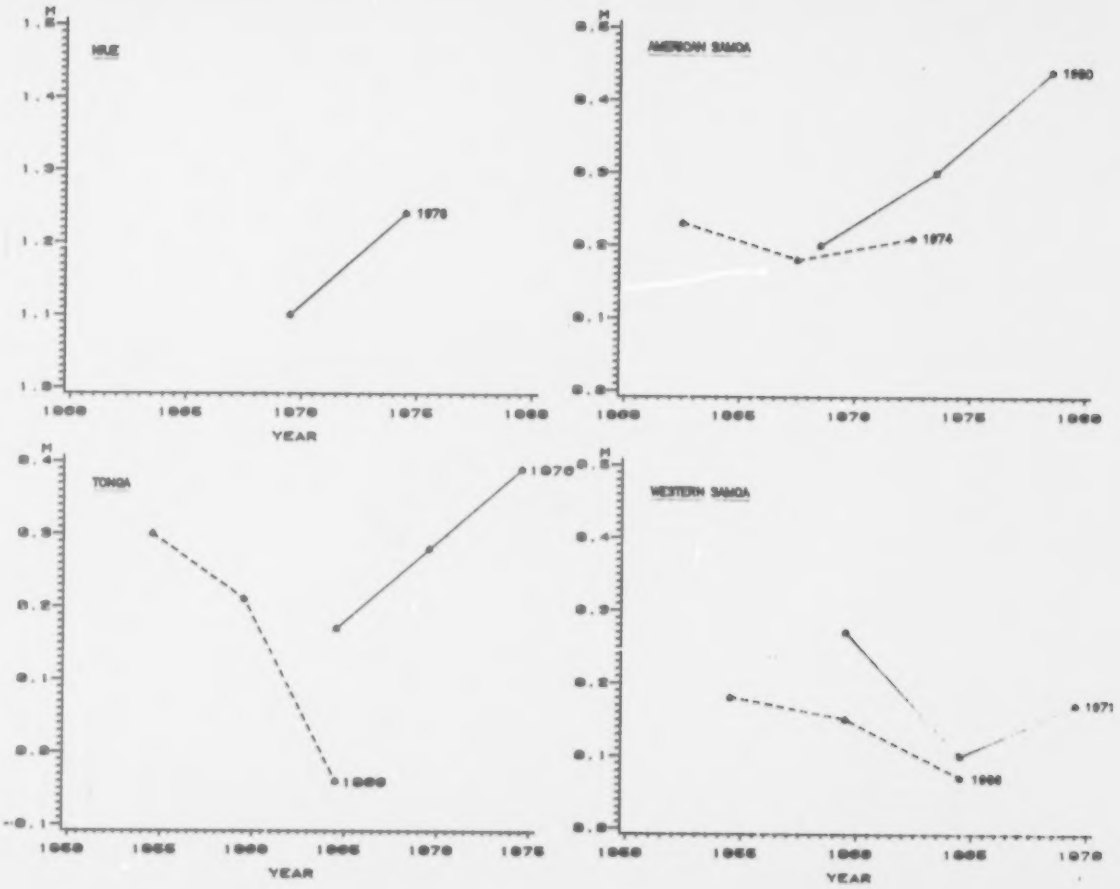
Source: Appendix Table 2.

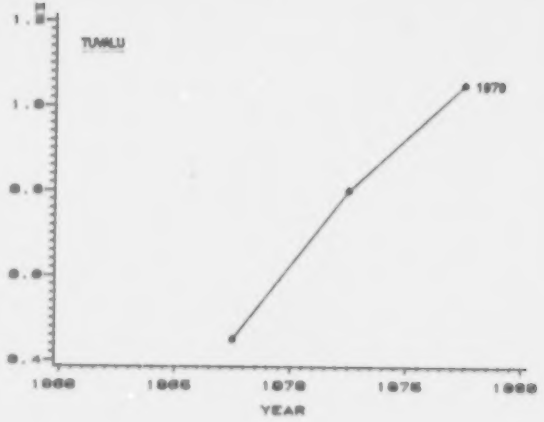
Figure 6. Trends in the *m* index of marital fertility control




NMI
1.0
0.8
0.6
0.4
0.2
0.0
1960
1973
PALAU
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
1960
1973
TTPI
0.5
0.4
0.3
0.2
0.1
0.0
1960
1973
1967
MARSHALLS
0.5
0.4
0.3
0.2
0.1
0.0
1960
1973
1960
1965
1970
1975
1980
YEAR


FSM
POHNPEI AND KOSRAE
TRUK
YAP
1973
1980
YEAR
1960
1965
1970
1975
1980


NIUE
1978
AMERICAN SAMOA
1980
1974
TONGA
1978
1969
WESTERN SAMOA
1971
1966
YEAR
YEAR



Source: Table 4.

program since 1962, established at about the same time that marital fertility began its rapid decline (Lucas and Ware 1981; throughout this paper, statements about family planning programs are based on information from this source).

Table 5 shows that the own-children fertility estimates are on the whole about 6–8 percent higher than estimates derived from maternity histories in the 1974 World Fertility Survey in Fiji, and usually about 15–20 percent higher than comparable estimates based on vital registration. Differences tend to be greater at the early and late reproductive ages than at the middle reproductive ages. These comparisons suggest that births are somewhat underregistered, more so at the extreme than at the peak reproductive ages. Underregistration appears greater for Fijians than for Indians. Annual fluctuations in the OC/VR ratios suggest that the ratio for any given year should be viewed as approximate, as should ratios for the other island groups considered here.

Solomon Islands

Solomon Islands differs markedly from Fiji in its level of economic, social, and demographic development. The two island groups together illustrate a general proposition that holds not only for Melanesia but also for Micronesia and Polynesia: namely, that for fertility estimation purposes none can be treated as a homogeneous aggregate. There is, in fact, considerable variation both among and within them.

Of the island groups considered in this paper, Solomon Islands is the largest in land area and lowest in density. As recently as 1976, fertility had not yet begun to decline. The population growth rate is very high, at about 3.3 percent per annum. The reported sex ratio is abnormally high, probably reflecting relative underenumeration of females in the census. Myers's index in 1976 was 3.7, indicating moderately accurate age reporting. Non-own factors are fairly low, consistent with low rates of out-migration and perhaps indicating that adoption is not so prevalent as in some other Pacific societies. Mortality is comparatively high, with life expectancy about 54 years. This is one of the lowest life expectancies in the Pacific.

Fertility in Solomon Islands increased substantially over the estimation period of 1964–76. The TFR increased by approximately 1.5 children, from about 6.5 to 8. At the same time, mean age at first marriage fell. Age-specific birth rates increased mainly at the younger ages, indicating that falling age at marriage accounts for most of the TFR increase. But marital fertility also rose slightly, perhaps owing to shorter breastfeeding, although we have no direct evidence on this. The substantial decline of age-specific marital fertility at 15–19 in Figure 5 is probably a spurious finding (which, as we shall see, emerges also for several of the other island groups we shall con-

Table 5. Ratios of fertility estimates derived by the own-children (OC) method to fertility estimates based on alternative sources (AS)

Island group	Year of estimates	TFR (OC)	TFR (AS)	OC/AS ratios							
					ASBRs						
				TFR	15–19	20–24	25–29	30–34	35–39	40–44	45–49
Melanesia											
Fiji											
Fijians	1967	5.37	5.18	1.04	1.07	0.99	1.11	1.12	0.94	0.77	u
	1971	4.74	3.84	1.23	1.20	0.96	1.17	1.40	1.43	1.78	u
(AS = WFS)	1971–73	4.71	4.46	1.06	0.90	1.01	1.10	0.97	1.09	1.20	u
(AS = VR)	1971–73	4.71	3.64	1.30	0.75	1.03	1.26	1.40	1.42	1.91	u
Indians	1967	4.81	3.99	1.21	1.20	1.14	1.13	1.24	1.16	1.79	u
	1971	4.10	3.60	1.14	1.38	1.08	1.10	1.13	1.07	1.41	u
(AS = WFS)	1971–73	3.82	3.54	1.08	0.99	1.01	1.07	1.15	1.23	1.17	u
(AS = VR)	1971–73	3.82	3.33	1.15	1.42	1.11	1.09	1.08	1.12	1.47	u
Solomon Islands	1970	7.10	5.62	1.26	2.61	1.32	1.22	1.20	1.17	1.02	1.24
Micronesia											
Guam	1980	3.16	3.24	0.98	0.91	0.96	0.98	0.92	1.11	0.96	4.00
Kiribati	1973	4.38	2.73	1.61	1.21	1.36	1.43	1.96	2.33	2.58	1.67
TTPI	1967	7.51	6.86	1.10	1.15	1.02	0.99	1.10	1.13	1.27	3.23
	1973	6.89	5.36	1.28	1.10	0.95	1.24	1.39	1.43	1.68	7.25
NMI	1967	7.60	8.40	0.90	0.80	0.78	0.89	0.78	1.20	1.18	1.15
	1973	5.09	5.14	0.99	0.84	0.87	0.93	0.84	1.38	1.24	16.50

Table 5. *(continued)*

Island group	Year of estimates	TFR (OC)	TFR (AS)	OC/AS ratios							
					ASBRs						
				TFR	15–19	20–24	25–29	30–34	35–39	40–44	45–49
Marshalls	1967	8.10	8.04	1.01	1.16	0.99	0.88	1.06	0.92	1.06	3.29
	1973	7.59	6.22	1.22	1.08	0.88	1.21	1.37	1.54	1.41	6.00
Palau	1967	8.08	6.88	1.17	0.76	0.99	0.86	1.21	1.57	1.25	7.53
	1973	6.69	5.36	1.25	1.03	0.60	1.23	1.33	1.77	2.13	32.00
FSM	1967	7.15	6.12	1.17	1.26	1.13	1.09	1.18	1.10	1.39	2.67
	1973	7.08	5.08	1.39	1.24	1.09	1.33	1.55	1.37	1.80	6.00
Ponape & Kosrae	1967	7.63	6.33	1.21	1.01	1.22	1.18	1.21	1.19	1.21	2.40
	1973	7.08	5.87	1.21	1.18	0.93	1.22	1.48	1.06	1.45	3.20
Truk	1967	6.90	5.94	1.16	1.47	1.10	1.14	1.17	0.94	1.43	3.10
	1973	7.40	4.58	1.61	1.36	1.32	1.41	1.64	1.78	2.11	11.83
Yap	1966	6.26	6.20	1.01	0.96	0.84	0.92	1.18	1.03	2.08	0.36
	1967	6.80	6.39	1.06	1.08	0.90	0.69	1.11	1.56	1.83	2.14
	1980	5.78	4.88	1.18	1.03	0.88	1.25	1.44	0.88	2.01	2.89
Polynesia											
Niue	1967–71	7.53	6.23	1.21	1.06	1.17	1.19	1.14	1.56	0.94	5.40
	1972–76	5.26	4.28	1.23	1.48	1.18	1.27	1.06	1.39	1.54	u
American Samoa	1962–66	6.46	6.23	1.04	0.69	0.87	0.98	1.14	1.10	1.57	1.46
	1970	5.92	5.72	1.03	1.04	0.77	0.88	1.17	1.12	1.63	3.13
Western Samoa	1961–66	8.50	7.30	(1.16)	u	u	u	u	u	u	u
	1966–71	7.80	7.40	(1.27)	u	u	u	u	u	u	u
	1971			(1.27)	1.32	1.12	1.26	1.37	1.58	1.92	1.39

Tonga	1966	6.95	6.80	1.02	0.88	0.99	0.90	0.76	1.20	1.36	0.82
	1970	6.29	7.23	0.87	u	0.94	1.05	0.74	0.80	0.68	0.64
Tuvalu	1973	3.12	2.44	1.28	1.67	1.04	1.21	1.64	0.92	2.88	u

Sources: Unless otherwise indicated, rates based on alternative sources are based on birth registration, with denominators usually taken from a census during the same year. The alternative sources are:
Fiji: Fiji, Bureau of Statistics (1971; 1976: table 32).
Solomon Islands: Solomon Islands, Ministry of Finance (1981). In this case rates are based on census reports of births during the year previous to the 1970 census, for Melanesians and Polynesians only.
Guam: Births are from Guam, Department of Public Health and Social Services (1980); numbers of women are from U.S. Department of Commerce (1983a).
Kiribati: Births are from Kiribati, Ministry of Finance (1975); numbers of women are from Groenewegen and Bailey (1975).
Trust Territory of the Pacific Islands: Births are from U.S. Department of State (1981); numbers of women are from University of Hawaii (n.d.) and also from Trust Territory of the Pacific Islands High Commissioner's Office (1975). Comparison rates for Yap for 1966 are from Underwood (1969).
Niue: Niue, Department of Justice (1978).
American Samoa: For 1962–66, births are from Government of American Samoa (1962–66), and for 1970, births are from Government of American Samoa (1971). Numbers of women are interpolated between the 1960 and 1970 censuses.
Western Samoa: Government of Western Samoa (1978).
Tonga: Government of Tonga (1967); Kingdom of Tonga (1983).
Tuvalu: Macrae (1980).

Notes: OC denotes own children, AS denotes alternative source, VR denotes vital registration, and WFS denotes World Fertility Survey. The censuses on which the own-children fertility estimates are based are: American Samoa, 1974; Fiji, 1976; Guam, 1980; Kiribati, 1978; Niue, 1976; Solomon Islands, 1976; TTPI, 1980; NMI, 1980; Marshalls, 1980; Truk, 1980; Yap, 1973 (for 1966) and 1980 (for 1967 and 1980); Tuvalu, 1979; and Western Samoa, 1961 (for 1961–66), 1966 (for 1966–71), and 1971 (for 1971); and Tonga, 1976.

u—unavailable, either because the rate from the alternative source is not available, or because it is zero.

sider), perhaps having to do with an increasing proportion of consensual unions recorded as marriages in this age group between one census and the next. (This interpretation, though speculative, is consistent with the observed fall in age at marriage and the slight decline in the *m* index of marital fertility control.) The Solomon Islands family planning program started in 1973 but received only moderate support from the government and had not been very active or effective by 1976. Table 5 indicates that the own-children fertility estimates are about 26 percent higher than estimates based on vital registration, suggesting that birth registration is not complete. The figure of 26 percent is based on a single year and should be viewed as approximate.

Micronesia

The coverage of Micronesia includes Guam, Kiribati, and the Trust Territory of the Pacific Islands (TTPI). TTPI in turn is broken down into Northern Mariana Islands (NMI), Marshall Islands, Palau, and the Federated States of Micronesia (FSM). The states of FSM are Ponape, Kosrae, Truk, and Yap.

Guam

Guam has a comparatively large population for its land size, so that its population density is quite high. The population is about 42 percent indigenous Chamorro, 21 percent Filipino, and 37 percent Caucasian and others, including mixed races. The presence of Caucasians reflects the large U.S. military establishment. The population growth rate has been about 2 percent annually, partly because of in-migration. Guam is highly Westernized, with low mortality, low non-own factors, and reasonably accurate age reporting, as indicated by a Myers's index of 2.1. Fertility has been falling steadily, to levels that are among the lowest in the Pacific, and the *m* index has been steadily increasing, suggesting substantial use of birth control for family limitation. SMAM has been rising very slowly, indicating that most of the fertility decline has been due to fertility limitation within marriage. The decline in marital fertility has been concentrated at the older reproductive ages, and fertility at 15–19 has actually increased. By 1979, family planning services were provided not only by the government and a voluntary organization, but also by the military. Table 5 shows that fertility estimates based alternatively on own children and vital registration agree quite closely for 1980.

Kiribati

Kiribati used to be part of the Gilbert and Ellice Islands, which separated in the mid-1970s to become Kiribati (Gilberts) and Tuvalu (Ellice Islands).

Kiribati had a population of about 56,000 in 1978, spread over many small islands in a vast ocean area. Its population density is moderately high. The population growth rate has been moderate, owing partly to out-migration. At 0.97, the sex ratio is slightly on the female side, probably owing mainly to labor migration of males to work in the phosphate mines on Nauru. Non-own factors are moderately high. Myers's index was 4.6 in 1978, indicating moderately accurate age reporting. Life expectancy is comparatively low for the region, at about 54 years.

Age at marriage has been slowly but steadily increasing. The TFR fell from about 7 in the late 1960s to 4.5 by the mid-1970s. It remained at that level until the most recent census in 1978. The MTFR followed a similar course, though at a higher level. Age-specific birth rates and marital birth rates fell at all ages, indicating birth control for spacing as well as for limiting purposes. The *m* index increased steadily over the entire period. Comparison of fertility estimates based on own children with those based on vital registration in Table 5 suggests that births are substantially underregistered.

Trust Territory of the Pacific Islands (TTPI)

Until 1976 all of the island groups included here under TTPI were a single political unit. The Commonwealth of the Northern Mariana Islands (NMI) split off in 1976 and will be a Commonwealth of the United States. The remainder of TTPI is being further divided into three additional entities. These are the Republic of Palau, the Marshall Islands Republic, and the Federated States of Micronesia (FSM). As mentioned, the FSM consists of Kosrae, Ponape, Truk, and Yap. In 1977 Ponape and Kosrae separated politically. But for reasons of comparability with previous censuses, Ponape and Kosrae are left combined in this paper; they are in any case quite similar in their fertility behavior. (This similarity is evident from separate tabulations for Ponape and Kosrae, which were computed but are not shown here.)

Population density is medium for the TTPI as a whole, but within TTPI there is considerable variation. For example, Truk is very densely populated, but Palau is sparsely populated and becoming even more so, owing to out-migration. Reported sex ratios vary from 1.03 for Ponape and Kosrae in 1980 to 1.11 in Northern Mariana Islands in 1980. Growth rates are fairly uniform at about 2 percent annually, except for Palau and Yap, which have low or negative growth rates, and the Marshalls, which are growing at about 3 percent. All of the island groups within the TTPI have rather high estimated life expectancies. Non-own factors are sometimes quite high, rising in most cases to more than 30 percent for older children and in Yap to more than 40 percent. Myers's index is in the range of 1–3, indicating reasonably

accurate age reporting. (Myers's index rose slightly between the 1973 and 1980 censuses throughout most of TTPI, probably because interviewers received two weeks of training for the 1973 census, with considerable emphasis on how to collect age data, but only 2.5 days of training for the 1980 census.)

For the TTPI as a whole, fertility is high. TFRs and MTFRs generally rose slightly before 1965–70 and then fell slightly. Estimated fertility trends from three successive censuses overlap fairly closely, despite annual fluctuations. SMAM, though slowly rising, has been virtually constant at about 21.5 years. ASBRs and ASMBRs have changed very little. There does seem to be a slight tendency for age-specific marital birth rates at the younger ages to fall and rates at the older ages to rise, but this pattern of change may be an artifact of imperfections in the data. The fall in ASMBRs at younger ages and the rise at older ages are reflected in a falling *m* index, but it is highly unlikely that this decline has anything to do with birth control practices. Deliberate birth control for family limitation purposes appears to have been rare during the period under consideration.

According to comparisons shown in Table 5, own-children fertility estimates in TTPI are about 10 percent higher than registration-based estimates for 1967, and about 28 percent higher for 1973. The latter of these two estimates may be the more accurate. It is likely that the 10 percent figure for 1967 occurs because the alternative-source birth rate denominators were taken from the 1967 census, which is known to have suffered from undercount (University of Hawaii, School of Public Health, n.d.). The downward bias in the denominators raises the estimated birth rates computed from the alternative source. Thus there appears to be considerable underregistration of births.

The 1967 census was conducted by the U.S. Peace Corps with assistance from the University of Hawaii School of Public Health, and it is known to have been deficient in coverage on a number of outlying islands. The TTPI in general has had coverage problems; the 1973 census was taken to obtain a more complete enumeration because of less than adequate coverage in the 1970 census. When whole households or whole islands are missed, however, age-specific child–woman ratios and the own-children fertility estimates derived from them are not biased as long as the omitted population has the same fertility as the included population. In fact, examination of overlapping fertility trends based on successive censuses suggests that the own-children fertility estimates based on the 1967 census are reasonably accurate.

Northern Mariana Islands (NMI). NMI is one of the few component island groups of the TTPI where fertility began a definitive decline during the estimation period considered here. But NMI's population is small, so

that its fertility decline did not have an appreciable impact on the trend in fertility in the TTPI as a whole. Fertility in NMI fell rapidly between the late 1960s and the mid-1970s, tending to level off in the late 1970s. The TFR fell from about 8 to 4 and the MTFR from about 9 to 5.5. Estimated trends from successive censuses agree fairly well during the period of overlapping estimates. SMAM increased over the estimation period, somewhat more rapidly than for the TTPI as a whole. ASBRs and ASMBRs fell at all ages, indicating practice of birth control for spacing as well as for limiting births. In Figures 3 and 5, age-specific rates for the earlier period are based on the 1973 census and age-specific rates for the later period are based on the 1980 census. When, alternatively, the change in the age pattern of fertility is estimated solely from the 1980 census, the numbers are somewhat different, but it is still true that fertility declines at all ages, indicating birth control for spacing as well as limiting.

The marital birth rate at ages 15–19 (Appendix Table 2) shows a very large decline starting from an extremely high level. This finding is unquestionably spurious, as the estimated birth rate is many times higher than ever reliably documented in any other population, in the South Pacific or elsewhere. Evidently many births at 15–19 (and probably a good many at 20–24 as well) are occurring in unions not recorded as marriages in the census. It will be recalled that we estimate age-specific marital birth rates by dividing age-specific birth rates for all women by corresponding age-specific proportions currently married; therefore, to the extent that births occur in consensual unions, our estimates of age-specific marital birth rates are inflated. The fact that our estimate of marital fertility at 15–19 falls so dramatically may indicate that the prevalence of consensual unions is declining, or that the 1980 census definition of marriage was broadened to include more consensual unions, or both. The *m* index of fertility control also increased, and the agreement of overlapping trends in *m* from successive censuses is fairly good. (Because the *m* index, like the MTFR, is calculated using marital birth rates starting at age 20, it is unaffected by the highly biased rate at ages 15–19.) To our knowledge there is no formal government family planning program in NMI. The comparisons of TFRs estimated by the own-children method with TFRs estimated from vital registration data in Table 5 suggest that birth registration is essentially complete. The apparent over-registration of about 10 percent in 1967 probably occurs because of the 1967 census undercount, mentioned earlier, which has the effect of spuriously inflating birth rates estimated from vital registration statistics.

Marshall Islands. In the Marshalls, SMAM has been relatively constant over time, at a level slightly lower than that for the TTPI as a whole. Fertility also has been fairly constant over the estimation period, but estimates based on the 1973 census tend to be somewhat higher than those based

on the 1980 census during the period of overlapping estimates. In Figures 3 and 5 this results in slight declines in estimated ASBRs and ASMBRs at the peak reproductive ages that may not be real. When the change in the age pattern of fertility is graphed from estimates based solely on the 1980 census, however, basically the same age pattern of change emerges. The *m* index of fertility control remains essentially constant over the estimation period; results from each census separately suggest a decline in *m*, but the average *m* from each census shows virtually no change.

Palau. Palau (Belau) has a negative population growth rate owing to high rates of out-migration. SMAM increased fairly rapidly over the estimation period, to 25.2 in 1980. Fertility started falling rapidly from very high levels around 1966, rose somewhat in the late 1960s and early 1970s, and then continued to fall steeply thereafter. The fertility trend estimates from successive censuses overlap remarkably closely, and the closeness of the overlap confirms the reality of the temporary fertility increase in the late 1960s and early 1970s. This fertility increase is observable in all age-specific rates above age 20 as well as in TFRs and MTFRs, but the reasons for it are obscure. Over the estimation period as a whole, ASBRs and ASMBRs fell at all ages, except for 15–19, where marital fertility rose sharply. The reasons for this latter increase are again obscure. Overall, the fertility decline was very steep, with the TFR declining from almost 9 to slightly more than 3 in fourteen years. The *m* index increased steadily and steeply from the mid-1960s onward. There is no formal family planning program.

Federated States of Micronesia (FSM). Most of the component states of the FSM are demographically rather similar, except for Yap, where, in contrast with the other states, fertility seems to have begun to decline, though not by very much. SMAM increased slowly but steadily in the FSM (including Yap) over the estimation period. TFRs and MTFRs tended to rise slightly then fall slightly over the estimation period, remaining at a high level at the end. Thus the trend for the FSM resembles that for the TTPI as a whole, which is not surprising since the FSM accounts for some two-thirds of the TTPI's population. The overlap of trends estimated from successive censuses is quite close for the FSM as a whole. ASBRs tended to fall at the younger ages and rise at the older ages, but the changes were slight. The fall at the younger ages may have been due to rising age at marriage or possibly to reporting changes related to marriage. The *m* index declined substantially over the estimation period, and the overlapping trends in *m* based on successive censuses agree quite well. The decline in *m* clearly cannot be attributed to a decline in the use of family limitation practices, which did not previously exist, and its causes are unclear. Overall, it is apparent that as late as 1980 fertility transition had not yet begun in the FSM.

Polynesia

Our coverage of Polynesia is limited, the most important omission being French Polynesia. Hawaii is also excluded, since it is more similar to the mainland United States than to the rest of Polynesia. Included are Niue, American Samoa, Western Samoa, Tonga, and Tuvalu.

Niue

Niue has the second lowest population density of the island groups examined in this paper, and its population is declining even further owing to migration to New Zealand. It does have a balanced sex ratio, however, indicating that migration is not sex-selective. Life expectancy is high. Non-own factors are also high, probably because of temporary family separations due to high rates of migration. SMAM is quite high at almost 25 years and virtually constant over time. Fertility appears to have been falling rapidly since about 1970, although there is a mysterious trough in the trend around 1967. The trough may be largely real, since Myers's index is only 3.7, indicating fairly accurate age reporting. Large, real fluctuations are quite possible, in view of Niue's small population size of fewer than 4,000 persons. The TFR appears to have fallen very rapidly, from about 8 to 5 in five years. The decline occurred at all ages except 15–19, with decreases concentrated at ages over 25. The estimated ASMBRs indicate considerable difficulty with census measurement of nuptiality. The ASMBR at 15–19 is exceedingly large, in the neighborhood of 3,000 (Appendix Table 2), indicating that a great many unions in which births are occurring are not recorded as marriages in the census. The ASMBR at 15–19 is therefore greatly inflated, since it is calculated on the assumption that all births occur within marriage, by dividing the ASBR at 15–19 by the corresponding age-specific proportion currently married. To some extent this kind of distortion undoubtedly occurs also at 20–24. The steep tapering off of age-specific marital birth rates between ages 20 and 50, which undoubtedly is partly spurious, results in an inflated value of m. In sum, it does seem that marital fertility decline is well under way in Niue, but the measures of marital fertility and marital fertility control presented here are seriously distorted. To emphasize that they are severely biased, they are enclosed in parentheses in the tables. There is no government family planning program in Niue, and in fact the government is anxious to halt the decline of population size.

American Samoa

American Samoa, with a population of about 32,000 in 1980, is fairly densely populated. The estimates of life expectancy are high. Partly because of substantial net out-migration to Hawaii and the mainland United States, the

population growth rate is moderate, at about 1.8 percent per year. Sex ratios are within the normal range, indicating that this out-migration is not excessively sex-selective. Myers's index indicates considerable improvement in age reporting during the 1970s, with the index reaching 2.6 in 1980. Non-own factors are moderately high but have fallen somewhat between successive censuses. SMAM has been fairly high, at slightly more than 23 years, and it remained virtually constant over the estimation period.

Total fertility rates have been dropping fairly steadily since the mid-1960s. The TFR decreased from about 6.5 to slightly more than 4 children per woman by 1980, and this decline is accounted for almost entirely by reduction of marital fertility. The *m* index of marital fertility control rose steadily over the period under consideration. Overlapping trends of fertility and of the *m* index estimated from successive censuses are in close agreement. Although the government does not have a formal family planning program, it does support family planning for health purposes, and family planning supplies and services are readily available. In Table 5, own-children fertility estimates agree rather well with estimates based on vital registration, although the rates based on own children are slightly higher, particularly at the older reproductive ages. The comparatively high own-children estimates of fertility at the older reproductive ages may be due largely to adoption, which tends to distort the age pattern of the own-children fertility estimates but not the age pattern of the fertility estimates based on vital registration.

Western Samoa

Western Samoa has a land area many times larger than that of American Samoa, and it has a population more than four times as large. Its population density is moderately low. Despite a high rate of out-migration, fertility has declined very little, so that the growth rate is still moderately high, at about 2.2 percent annually. The trend in Myers's index from one census to the next is somewhat erratic, at moderately or quite low values. The sex ratio is at the upper end of the normal range. Non-own factors are high in Western Samoa, probably because of frequent, temporary family separations due to high rates of out-migration. Life expectancy is high, in the neighborhood of 65 years. SMAM, at about 21–22 years, changed little over the estimation period. Fertility has been very high, with the TFR in the neighborhood of 8 to 8.5. The own-children fertility estimates suggest that fertility rose slightly during the late 1950s and fell slightly during the late 1960s. The *m* index may have risen slightly during the late 1960s, but the trend is erratic. Overlapping fertility estimates suggest caution in interpreting estimates during the five years immediately preceding each census, based on children under five years of age. The pattern of overlap suggests

a spurious estimated fertility decline during the five years preceding each census. When the spurious fertility dip during the five years before each census is discounted, the fertility trends estimated from successive censuses overlap rather well. The estimated slight decline in fertility between 1967 and 1971, which may not be real, immediately preceded the founding of a family planning association as well as the start of a government program in 1971. Table 5 shows that the own-children fertility estimates are 16–27 percent higher than comparable estimates derived from vital registration. This comparison suggests fairly substantial underregistration of births.

Tonga

Tonga, with a population approaching 100,000 by the late 1970s, is fairly densely populated. The population sex ratio is slightly on the masculine side. Myers's index indicates moderately accurate age reporting. Because of substantial out-migration (mainly to New Zealand) and some fertility decline, population growth is modest, at about 1.5 percent per year. Estimated life expectancy is high, at above 65 years. Despite substantial out-migration, non-own factors are quite low. SMAM, at 24–25 years, changed little over the estimation period. Thus the decline in the TFR, from about 7 to 4, stemmed almost entirely from marital fertility decline. The *m* index of marital fertility control has increased steadily in recent years. Overlapping own-children fertility estimates based on successive censuses show rather poor agreement, as do overlapping estimates of the trend in the *m* index. Problems with data quality probably account for these discrepancies, but it is not clear precisely what these problems are. The 1966 census was a de facto count, whereas the 1976 census was more or less a de jure count, and this change may account for some of the discrepancies. Migration is unlikely to be the culprit, because other island groups with equally high migration rates, such as Western Samoa, show a much higher degree of consistency of overlapping estimates. Tonga has had a government family planning program since 1958 and private family planning associations since 1969. In Table 5, TFRs estimated alternatively from own children and from vital registration agree to within 13 percent in 1980. But estimates of the TFR based on own children are less than those based on vital registration, reversing the usual pattern. We are unable to explain this reversal.

Tuvalu

As mentioned earlier, the Gilbert and Ellice Islands, formerly under British trusteeship, split in the mid-1970s to become Kiribati (Gilberts) and Tuvalu (Ellice Islands). Tuvalu's population is much smaller than that of Kiribati, only about 7,400 in 1979. Its population density is quite high. Its

population growth rate, calculated from census totals in 1973 and 1979, is also very high, at 4.1 percent annually. This high growth occurred mainly because many persons migrated back to Tuvalu from Kiribati at about the time the two island groups became two separate governmental entities. Perhaps because of high rates of migration, non-own factors are quite high for Tuvalu. Life expectancy is moderately high at about 60 years. SMAM increased moderately over the estimation period, from slightly over 23 years to almost 25 years.

A government family planning program was started in the Gilbert and Ellice Islands in 1968. (A first attempt to establish a program in 1963 was unsuccessful.) A rapid decline in marital fertility commenced in both Kiribati and Tuvalu starting about 1968, at the time that the government family planning program began. The trends in fertility since 1968 have been remarkably similar in the two island groups. In both of them the TFR decline leveled off during the late 1970s. And in both places fertility has tended to decline at all reproductive ages, indicating that birth control was adopted for spacing and limiting purposes simultaneously. However, the level of the TFR has consistently been about one child lower in Tuvalu than in Kiribati. The *m* index shows a steady increase over time, consistent with the substantial decline in marital fertility. Since we have only one census on which to base own-children fertility estimates, no consistency checks based on examination of overlapping trends can be made. The comparison of fertility estimates based on own children with those based on vital registration in Table 5 suggests that births are fairly substantially underregistered, but not as much as in Kiribati.

CONCLUSION

This review of census-based estimates of fertility trends in Pacific Islands is primarily descriptive and offers little in the way of interpretation. The following observations, however, can be made: From the point of view of reproductive behavior, the Pacific Islands are highly diverse, not only among the major divisions of Micronesia, Melanesia, and Polynesia, but also within each division. Mortality, as measured indirectly from censuses, is low in the islands and shows less variability than fertility. As a result of low mortality, high proportions of children survive, providing parents with incentive to reduce family size, especially in those cases where population density is high (posing problems of population pressure and inheritance) and the safety valve of out-migration is either unavailable or unused. Throughout the region, age at marriage has been fairly high for some time, so that fertility declines, where they have occurred, have been due primarily to the advent of marital fertility control.

Appendix Table 1. Total fertility rates and age-specific birth rates, derived by the own-children method

Island group	Census[a] year	Period of estimate[b]	TFR[c]	Age-specific birth rates[d] 15–19	20–24	25–29	30–34	35–39	40–44	45–49
Melanesia										
Fiji										
Fijians	1976	1962–66	5.95	68	269	301	260	186	86	18
		1967–71	5.16	57	232	269	219	160	76	17
		1972–76	4.53	56	218	242	191	126	59	14
Indians	1976	1962–66	6.28	144	351	301	224	146	72	18
		1967–71	4.40	92	278	229	144	88	38	12
		1972–75	3.55	64	240	203	116	55	24	7
Solomon Islands	1976	1967–71	6.97	115	268	306	295	244	116	51
		1972–76	7.66	138	309	349	309	241	139	46
Micronesia										
Guam	1980	1966–70	4.24	57	190	222	177	128	61	11
		1971–75	3.55	69	181	188	137	86	39	10
		1976–80	3.02	66	171	164	110	64	24	6
Kiribati	1978	1964–68	6.85	109	296	323	296	226	103	16
		1969–73	5.13	91	229	246	216	161	67	15
		1974–78	4.51	73	218	220	199	134	49	10
TTPI	1967	1953–57	6.87	159	316	315	268	192	100	24
		1958–62	7.40	147	327	357	300	219	104	27
		1963–67	7.08	112	302	334	313	223	104	29
	1973	1959–63	7.39	146	322	351	297	220	106	37
		1964–68	7.76	123	311	353	338	257	127	43
		1969–73	7.36	107	295	338	316	253	121	42

Appendix Table 1. *(continued)*

Island group	Census[a] year	Period of estimate[b]	TFR[c]	Age-specific birth rates[d] 15–19	20–24	25–29	30–34	35–39	40–44	45–49
	1980	1966–70	7.41	116	304	336	307	241	122	54
		1971–75	6.91	107	276	318	281	221	126	55
		1976–80	6.28	104	264	290	253	187	110	47
NMI	1973	1959–63	8.00	110	351	415	320	259	126	19
		1964–68	7.68	101	329	376	352	243	108	27
		1969–73	6.20	105	297	291	252	204	73	16
	1980	1966–70	6.81	94	294	326	269	251	96	32
		1971–75	4.90	83	241	235	189	139	75	18
		1976–80	4.24	103	227	208	163	86	42	17
Marshalls	1973	1959–63	7.92	171	338	364	316	238	114	44
		1964–68	8.72	161	345	398	383	274	135	49
		1969–73	8.42	126	322	380	374	284	130	70
	1980	1966–70	8.14	147	346	377	344	241	124	49
		1971–75	7.92	149	324	363	317	238	131	62
		1976–80	7.88	155	332	356	305	242	133	53
Palau	1973	1959–63	8.25	91	271	376	368	326	140	76
		1964–68	8.47	73	285	357	360	325	208	86
		1969–73	6.62	81	258	294	270	223	144	54
	1980	1966–70	7.42	68	267	328	299	283	152	86
		1971–75	6.26	83	232	287	244	193	136	76
		1976–80	4.23	53	185	211	155	100	79	63
FSM	1973	1959–63	6.90	156	317	326	272	188	91	32
		1964–68	7.27	121	294	332	316	240	114	36
		1969–73	7.34	104	288	341	318	258	124	35

	1980	1966–70	7.06	117	295	288	306	232	119	54
		1971–75	7.10	99	272	326	298	240	132	54
		1976–80	6.50	92	256	297	273	209	125	49
Ponape & Kosrae	1973	1959–63	7.47	158	342	343	293	215	115	29
		1964–68	7.78	110	316	348	338	258	146	40
		1969–73	7.74	108	308	362	325	274	132	39
	1980	1966–70	7.58	100	320	351	323	243	125	54
		1971–75	7.40	112	292	349	309	240	134	44
		1976–80	6.74	105	276	309	288	206	121	45
Truk	1973	1959–63	6.78	158	302	325	267	187	85	32
		1964–68	7.16	134	292	328	308	238	96	35
		1969–73	7.40	103	286	344	329	258	125	35
	1980	1966–70	7.28	128	295	325	308	227	123	50
		1971–75	7.17	90	268	320	306	254	135	61
		1976–80	6.68	80	247	306	279	228	144	53
Yap	1973	1959–63	5.89	143	312	282	227	126	54	34
		1964–68	6.23	97	233	307	286	195	95	32
		1969–73	6.01	100	231	265	267	214	95	30
	1980	1966–70	6.14	124	213	265	251	216	88	72
		1971–75	5.98	96	228	276	241	181	113	60
		1976–80	5.01	106	230	227	188	145	64	42
Polynesia										
Niue	1976	1967–71	7.53	106	360	435	316	211	51	27
		1972–76	5.26	121	305	285	200	100	40	0
American Samoa	1974	1960–64	6.49	42	231	329	322	240	110	25
		1965–69	6.48	46	226	318	306	245	119	37
		1970–74	5.46	40	210	264	238	190	109	41
	1980	1966–70	6.21	56	214	306	292	223	110	42
		1971–75	5.12	39	203	254	217	171	93	48
		1976–80	4.67	42	175	254	200	143	76	44

Appendix Table 1. (*continued*)

Island group	Census[a] year	Period of estimate[b]	TFR[c]	Age-specific birth rates[d] 15–19	20–24	25–29	30–34	35–39	40–44	45–49
Western Samoa	1961	1947–51	8.08	125	252	308	296	263	211	160
		1952–56	8.3-	103	266	327	318	264	214	180
		1957–61	8.30	73	268	342	324	273	204	177
	1966	1952–56	8.15	134	324	375	339	251	144	61
		1957–61	8.73	118	337	412	378	302	146	53
		1962–66	8.14	76	316	383	380	278	147	46
	1971	1957–61	8.59	136	356	400	378	278	127	41
		1962–66	8.46	98	343	403	371	289	150	38
		1967–71	7.78	66	316	390	350	263	131	40
Tonga	1966	1952–56	6.49	78	226	286	282	219	126	81
		1957–61	6.61	57	230	305	294	230	136	71
		1962–66	7.16	37	222	325	314	263	178	93
	1976	1962–66	6.16	44	213	311	283	223	125	33
		1967–71	6.15	40	232	316	283	213	114	32
		1972–76	4.66	25	175	243	220	166	79	24
Tuvalu	1979	1965–69	4.99	44	213	258	225	172	76	8
		1970–74	3.31	47	190	175	129	76	41	5
		1975–79	2.80	27	139	160	144	68	22	1

a. The census to which the own-children method was applied.

b. The time period to which the fertility estimates pertain.

c. Rate per woman.

d. Rates per thousand women.

Appendix Table 2. Marital total fertility rates and age-specific marital birth rates

Island group	Census year	Period of estimate	MTFR[a]	Age-specific marital birth rates[b]						
				15–19	20–24	25–29	30–34	35–39	40–44	45–49
Melanesia										
Fiji										
Fijians	1976	1962–66	7.40	666	475	371	298	213	101	22
		1967–71	6.48	581	420	334	250	182	88	21
		1972–76	5.84	581	410	309	220	143	69	17
Indians	1976	1962–66	6.28	511	436	323	237	156	81	22
		1967–71	4.65	444	372	251	154	94	42	15
		1972–76	4.00	370	347	232	126	60	27	9
Solomon Islands	1976	1967–71	8.56	900	484	393	350	282	139	64
		1972–76	9.02	656	501	438	362	280	166	58
Micronesia										
Guam	1980	1966–70	5.02	494	301	266	203	146	74	14
		1971–75	4.24	638	299	231	159	99	47	13
		1976–80	3.71	661	296	206	130	75	29	7
Kiribati	1978	1964–68	7.85	407	429	389	341	269	121	21
		1969–73	6.04	374	352	308	255	192	82	19
		1974–78	5.51	330	345	282	241	160	60	13
TTPI	1967	1953–57	7.88	922	511	391	313	219	113	30
		1958–62	8.85	833	549	456	356	255	120	33
		1963–67	8.85	621	528	441	379	265	123	35
	1973	1959–63	8.28	873	495	420	337	244	114	45
		1964–68	9.02	721	496	435	390	291	141	52
		1969–73	8.85	612	488	428	372	293	138	51

Appendix Table 2. (*continued*)

Island group	Census year	Period of estimate	MTFR[a]	Age-specific marital birth rates[b]						
				15–19	20–24	25–29	30–34	35–39	40–44	45–49
	1980	1966–70	8.73	674	492	418	358	276	137	66
		1971–75	8.36	604	463	406	333	258	145	66
		1976–80	7.80	580	461	382	306	222	131	57
NMI	1973	1959–63	9.11	3716	572	497	312	284	132	24
		1964–68	9.11	1994	558	470	367	275	118	34
		1969–73	7.67	1461	527	381	282	239	85	21
	1980	1966–70	8.20	1635	505	413	286	287	107	40
		1971–75	6.18	1058	433	311	216	164	89	24
		1976–80	5.49	1035	428	290	202	105	52	22
Marshalls	1973	1959–63	8.88	1113	553	419	368	251	130	56
		1964–68	9.85	877	551	465	443	296	154	60
		1969–73	9.64	587	502	451	430	314	148	84
	1980	1966–70	9.26	749	547	444	397	263	141	60
		1971–75	8.94	655	501	434	364	266	150	74
		1976–80	8.87	600	502	433	348	278	152	62
Palau	1973	1959–63	10.07	729	406	465	531	386	145	82
		1964–68	10.88	661	486	468	505	392	226	98
		1969–73	8.99	839	514	412	369	275	165	64
	1980	1966–70	9.76	649	484	442	415	344	168	99
		1971–75	8.64	913	496	413	329	240	158	92
		1976–80	6.57	699	481	326	203	127	97	80
FSM	1973	1959–63	7.47	763	456	393	300	210	98	38
		1964–68	8.29	611	445	411	359	273	126	44
		1969–73	8.73	540	461	433	372	298	140	43

	1980	1966–70	8.16	597	457	359	351	266	133	66
		1971–75	8.56	517	446	417	352	279	151	66
		1976–80	8.11	497	446	391	331	247	147	59
Ponape & Kosrae	1973	1959–63	8.27	613	495	425	331	250	117	35
		1964–68	9.09	470	484	441	391	301	154	48
		1969–73	9.32	519	501	468	383	320	146	46
	1980	1966–70	9.04	450	502	448	376	283	134	64
		1971–75	8.98	562	486	456	368	281	151	52
		1976–80	8.45	602	490	413	350	241	142	53
Truk	1973	1959–63	7.15	1231	417	380	295	203	97	39
		1964–68	7.95	921	429	395	348	265	110	42
		1969–73	8.67	631	448	426	382	294	144	42
	1980	1966–70	8.24	836	444	395	352	256	141	60
		1971–75	8.55	530	430	399	358	293	156	74
		1976–80	8.28	428	427	393	336	269	167	64
Yap	1973	1959–63	6.87	422	533	378	226	138	57	42
		1964–68	7.42	323	398	414	305	223	105	40
		1969–73	7.32	379	393	361	307	253	110	39
	1980	1966–70	7.19	433	364	359	275	250	99	90
		1971–75	7.40	383	389	376	286	218	134	78
		1976–80	6.31	499	392	312	243	182	79	55
Polynesia										
Niue	1976	1967–71	11.52	3401	934	632	358	286	61	34
		1972–76	8.34	2934	836	393	267	123	50	0
American Samoa	1974	1960–64	8.44	474	491	408	369	265	126	30
		1965–69	8.45	529	491	396	353	271	135	43
		1970–74	7.28	468	467	331	276	211	123	47

Appendix Table 2. (*continued*)

Island group	Census year	Period of estimate	MTFR[a]	Age-specific marital birth rates[b]						
				15–19	20–24	25–29	30–34	35–39	40–44	45–49
Western Samoa	1980	1966–70	8.03	648	465	382	337	247	126	49
		1971–75	6.86	460	452	319	251	190	105	55
		1976–80	6.47	618	418	340	236	162	86	52
	1961	1947–51	10.96	959	525	450	403	329	283	203
		1952–56	10.93	744	509	449	408	321	272	226
		1957–61	10.49	496	474	443	393	324	245	220
	1966	1952–56	10.66	969	618	515	434	305	183	77
		1957–61	10.92	804	595	534	458	357	175	65
		1962–66	10.25	417	540	470	463	345	175	58
	1971	1957–61	10.70	926	630	519	459	329	153	51
		1962–66	10.57	543	585	495	450	358	178	48
		1967–71	9.60	421	538	462	407	315	151	48
Tonga	1966	1952–56	10.40	746	572	584	398	262	156	108
		1957–61	9.92	618	549	520	386	273	165	90
		1962–66	10.00	467	503	477	386	311	209	114
	1976	1962–66	8.70	555	483	456	348	264	147	41
		1967–71	8.65	615	530	439	340	250	132	38
		1972–76	6.81	479	434	349	267	193	92	28
Tuvalu	1979	1965–69	7.40	368	501	370	296	209	93	11
		1970–74	5.38	505	468	260	183	104	54	7
		1975–79	4.97	494	391	264	207	98	31	2

a. Rate per woman.

b. Rates per thousand women.

Appendix Table 3. Singulate mean ages at marriage and age-specific proportions currently married (in percent)

Island group	Census year	SMAM	Proportions married, by age						
			15–19	20–24	25–29	30–34	35–39	40–44	45–49
Melanesia									
Fiji									
Fijians	1956	22.3	11.5	57.7	79.4	86.0	85.4	82.7	78.9
	1966	22.4	9.9	56.3	81.6	88.0	88.1	86.4	82.8
	1976	22.1	9.6	52.2	77.4	86.2	87.7	86.2	82.3
Indians	1956	18.1	45.1	89.5	94.6	94.8	91.6	86.7	77.1
	1966	20.3	22.3	77.3	92.9	94.5	94.2	90.5	83.2
	1976	21.1	15.7	66.4	86.1	91.6	90.2	87.6	81.1
Solomon Islands	1970	22.3	15.3	57.2	78.4	84.6	86.4	83.6	79.6
	1976	21.1	25.3	64.8	80.7	85.9	85.7	84.5	79.5
Micronesia									
Guam	1960	20.5	12.8	67.2	86.3	89.4	89.3	83.1	79.6
	1980	22.1	9.5	56.3	78.6	84.3	85.1	82.1	81.9
Kiribati	1968	19.9	25.6	67.1	81.6	85.8	84.0	83.1	76.9
	1973	20.3	23.1	63.3	78.5	83.5	84.0	79.6	77.0
	1978	20.8	20.8	62.8	77.9	81.6	83.3	82.9	76.3
TTPI	1973	21.8	17.7	59.5	77.9	84.1	85.6	86.6	82.3
	1980	22.2	18.2	56.1	74.8	81.8	83.2	83.2	82.0
NMI	1973	22.9	8.3	55.2	74.7	86.2	84.2	83.8	78.6
	1980	23.4	11.0	51.9	70.1	77.7	80.5	77.6	78.1
Marshalls	1973	20.8	23.0	64.8	83.5	87.2	89.3	87.7	83.8
	1980	20.9	27.3	66.9	81.6	87.9	86.2	87.7	86.8

Appendix Table 3. *(continued)*

Island group	Census year	SMAM	Proportions married, by age						
			15–19	20–24	25–29	30–34	35–39	40–44	45–49
Palau	1973	24.1	8.9	46.0	69.1	74.3	80.4	85.3	82.3
	1980	25.2	6.9	34.3	62.5	77.1	78.1	79.0	76.3
FSM	1973	21.5	19.0	60.6	77.8	84.4	85.8	87.1	82.6
	1980	22.0	18.3	55.5	75.1	81.0	83.6	84.0	82.1
Ponape & Kosrae	1973	22.0	19.6	59.6	76.3	83.9	85.5	88.6	84.2
	1980	22.7	16.1	54.3	73.9	81.4	85.3	83.3	84.6
Truk	1973	21.3	17.2	61.7	79.8	85.2	86.7	86.6	82.7
	1980	21.6	19.6	55.7	76.5	82.1	83.8	85.9	82.7
Yap	1973	21.2	24.6	58.7	73.2	83.5	82.7	84.4	77.7
	1980	21.7	19.4	58.8	72.5	73.9	78.0	78.9	75.9
Polynesia									
Niue	1971	24.8	3.6	37.5	70.7	81.8	77.5	82.4	80.5
	1976	24.9	4.6	35.4	74.5	68.5	85.0	80.6	77.8
American Samoa	1956	22.9	5.3	46.9	76.1	82.9	83.5	82.6	79.7
	1960	23.2	8.9	47.4	80.8	87.5	90.5	86.9	82.4
	1974	23.2	8.4	44.5	79.6	86.0	90.1	88.8	87.3
	1980	24.3	5.5	39.5	70.9	83.3	85.9	87.4	82.8
Western Samoa	1956	22.1	14.3	54.4	74.9	80.2	83.3	80.9	80.2
	1961	21.5	15.1	58.6	79.3	84.6	85.5	85.1	81.2
	1966	20.3	21.2	58.6	83.5	80.0	76.0	83.3	78.6
	1971	22.0	9.9	59.1	85.7	92.2	91.0	91.0	87.2
Tonga	1956	25.0	9.9	40.6	53.4	73.3	83.8	81.5	76.5
	1966	24.0	7.2	45.3	73.0	83.8	84.8	86.2	83.7
	1976	24.3	4.6	38.6	68.8	81.7	86.3	85.8	84.2

Tuvalu	1968	23.6	10.9	41.7	68.9	73.7	79.0	79.2	74.1
	1973	24.2	8.1	39.9	66.5	68.0	70.3	73.2	70.7
	1979	25.4	3.2	31.9	55.2	70.7	68.5	69.2	69.5

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